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TAGIOUS AND INFECTIOUS DISEASES,

MEASURES FOR THEIR PREVENTION AND ARREST.

LL POX (VARIOLA); MODIFIED SMALL POX
ARIOLOID); CHICKEN POX (VARICELLA);
COW POX (VARIOLÆ VACCINAÆ);

ACCINATION,

SPURIOUS VACCINATION.

USTRATED BY EIGHT COLORED PLATES.

CIRCULAR No. 2,

ARED FOR THE GUIDANCE OF THE QUARANTINE OFFI-
ERS AND SANITARY INSPECTORS OF THE BOARD OF
HEALTH OF THE STATE OF LOUISIANA.

BY JOSEPH JONES, M. D.,

SIDENT OF THE BOARD OF HEALTH OF THE STATE OF LOUISIANA.

CT FROM THE REPORT OF THE BOARD OF HEALTH TO THE GENERAL ASSEMBLY
OF LOUISIANA, 1883, 1884.

BATON ROUGE:
PRINTED BY LEON JASTREMSKI STATE PRINTER
1884.

OSEPH JONE
RESIDENCE:
156 WASHINGTON
Cor. Camp St., 4th
OFFICE, 30 DRYADE
Bet. Canal and Com
DDRESS, P. O. Box 1500, N

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PREFACE.

The prevalence of small-pox in the States tributary to the Mississippi river, and the constant danger to which Louisiana is exposed from her geographical position, and from the peculiar *race conditions* of THE lower sections of the Mississippi valley, as well as the neglect of vaccination by large masses of the population, and the growth of a sentiment opposed to vaccination, on the part of the profession and people, have rendered this work necessary.

No more important subject can engage the attention of the medical profession and sanitary authorities, and of the representatives of the State municipal and parish governments, than the prevention of small-pox.

Vaccination and all that relates to vaccination, is of paramount importance to the health and material welfare of the inhabitants of Louisiana.

JOSEPH JONES,M. D.

No. 156 Washington street, Fourth District, New Orleans, La., 1884.

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CONTAGIOUS

AND

INFECTIOUS DISEASES

MEASURES

FOR THEIR

PREVENTION AND ARREST,

BY

JOSEPH JONES, M. D.,

PRESIDENT OF THE

BOARD OF HEALTH

OF THE

STATE OF LOUISIANA.

BATON ROUGE:
LEON JASTREMSKI, STATE PRINTER.
1883.

VACCINATION: VARIOLÆ VACCINÆ (COW POX): VARIOLA, AND VARIOLOID: ACCIDENTS ATTENDING VACCINATION: SPURIOUS VACCINATION.

CIRCULAR NO. 2—PREPARED FOR THE GUIDANCE OF THE QUARANTINE OFFICERS AND SANITARY INSPECTORS OF THE BOARD OF HEALTH OF THE STATE OF LOUISIANA,

—— BY ——

JOSEPH JONES, M. D., PRESIDENT OF THE BOARD OF HEALTH OF THE STATE OF LOUISIANA.

The question of the arrest and eradication of small-pox has been regarded and treated by the Executive Officer of the Board of Health of the State of Louisiana as of transcendent importance to the happiness and welfare of the people, and facts were recorded in Circular No. 1, issued on the sixteenth of August, 1883, which revealed the difficulties of dealing with this question in the delta of the Mississippi, and more especially in the city of New Orleans; and the measures of compulsory vaccination, isolation and disinfection which had been in past times urged upon the General Assembly and the municipal authorities were again strenuously advocated.

No city upon the globe is more exposed to the introduction and spread of small-pox than New Orleans; and at the same time the greatest difficulties are experienced in the introduction of efficient measures for the exclusion and arrest of this pestilence.

This proposition will be sustained by the following facts:

1. New Orleans has a larger colored population than any other city on the North-American Continent, the United States census of 1880 giving total population 216,090; whites, 158,307; colored, 57,617. A large proportion of the negro population not only neglect vaccination, but are opposed to this protective measure; New Orleans, therefore, has the largest population unprotected and liable to the ravages of small-pox.

2. New Orleans has the largest negro population immediately tributary to it of any civilized city in the world. In those States which are most nearly related to New Orleans by geographical position and commercial relations, the white population numbers 11,082,192, out of a total population of the United States of 50,155,783, being almost one-fifth; the colored population numbers 3,158,051 out of a colored population in the United States of 6,580,793, being almost one-half.

Whilst only one-fifth of the total population of the United States inhabits the States of Alabama, Arkansas, Kentucky, Louisiana, Mississippi, Missouri, Tennessee and Texas, nearly one-half the entire negro population of this great country is gathered within the bounds of these States which are most directly connected with New Orleans, by geographical position and commercial relations.

3. The surrounding States tributary to New Orleans have neither established efficient quarantines against small-pox, nor have their health authorities reported the introduction and existence of this disease, to the Board of Health of the State of Louisiana.

Small-pox has been prevailing in the Western cities and in the villages and plantations along the Mississippi river, and cases have during 1881, 1882 and 1883, been continuously introduced into New Orleans by the inhabitants of the plantations; the settlements of which form almost a continuous village for nearly one thousand miles along the banks of this mighty stream.

It is not surprising that ignorance of sanitary laws, and neglect of vaccination, combined with unrestricted intercourse, should have found in the colored race along the banks of the Mississippi the most favorable condition for the lodgment, propagation, spread and continuance of small-pox. A vast floating colored population continuously pours in and out of New Orleans; large numbers of colored seamen man the steamboats which conduct the internal commerce of this great valley, and they have during the years 1881, 1882 and 1883, been the medium of introducing a constant stream of small-pox poison into New Orleans.

4. As long as small-pox prevails amongst the white and colored population of the Mississippi Valley and of the States tributary to this commercial centre, just so long will this disease continue to find successive lodgment in New Orleans. The extent to which the population of New Orleans will suffer from each introduction of the small-pox poison will depend upon the number of citizens, unprotected by vaccination or by preceding attacks of small-pox.

5. The opposition to vaccination is not confined to the uneducated and comparatively helpless colored race, who by the results of the American Civil War of 1861-1865, have been precipitated into a state of freedom, demanding for its intelligent and successful enjoyment some knowledge of sanitary as well as of political science; bitter opponents to vaccination have been found amongst the white race, and in the ranks of the medical profession, and their efforts have up to the present moment defeated in the General Assembly of Louisiana, and in the Municipal Government of New Orleans, all efforts to eradicate small-pox, by the institution of laws rendering vaccination compulsory.

On the twenty-ninth of May, 1883, the following ordinance relative to vaccination was presented to the Common Council of New Orleans, read in full and referred to the Committee on Health; on the twenty-sixth of June 1883, read and failed to pass; August 14, read and ordered to be laid over, August 28, read and ordered to be laid over one week; September 4, 1883, **lost**:

AN ORDINANCE BY THE CITY COUNCIL.

"SECTION 1. *That all children* of the city of New Orleans shall be vaccinated before same attain the age of two years, said vaccination shall be successful or repeated such a number of times as to make it evident that successful vaccination is impossible; and such children and all other persons as is hereinafter provided, shall be re-vaccinated as often as the Board of Health or other legally authorized officers shall require, provided that no person or child of full age shall be required to be successfully vaccinated more than once during any period of five years.

"SEC. 2. *Be it further ordained*, that any resident of the city of New Orleans over the age of fifteen years, who has not been successfully vaccinated after a lapse of five years, since successful vaccination, and who after twenty-four hours' notice to that effect given by officers legally authorized thereto, shall fail or refuse to be vaccinated, may be arrested and taken before the Recorder's Court, having jurisdiction, and on conviction, fined in a sum not exceeding *twenty-five dollars or imprisonment* not exceeding thirty days, the fines so imposed and collected to be turned over to the Board of Health, and any parent or guardian or person having control of a child under fifteen years of age, and who on notice as herein stated, shall fail to vaccinate shall be subject to the penalties herein provided.

"SEC. 3. *Be it further ordained*, that the Board of Health shall be and is hereby authorized to provide the means and facilities for vaccination which shall be free to all persons; and shall or may authorize the physician in attendance in any case on application to give a certificate of the time when successful vaccination shall have been performed on any person.

"Such certificate shall be evidence and proof of the fact therein stated, and a re-vaccination shall be necessary within a period of five years from the date of the vaccination stated therein."

This subject was again urged upon the attention of the Board of Health of the State of Louisiana, as will be shown by the following extracts from the proceedings of that date:

EXTRACT FROM THE PROCEEDINGS OF THE MEETING OF THE BOARD OF HEALTH, STATE OF LOUISIANA, SEPTEMBER 6, 1883.

The President, Dr. Joseph Jones, presented the following report:

HEALTH OF NEW ORLEANS.

Mortality of New Orleans, during the Months of July and August, 1883.

WEEK ENDING	Deaths.		Total Deaths.	Death Rate.		Total Death Rate.
	W.	C.		W.	C.	
July 7	75	41	116	23.83	35.56	26.98
July 14	79	38	117	25.11	32.96	27.21
July 21	82	58	140	26,06	50.31	32.56
July 28	95	45	140	30.19	39.03	32.56
August 4	83	55	138	26.38	47.71	32.09
August 11	77	48	125	24,47	41.63	29.07
August 18	74	46	120	23.52	39.90	27.91
August 25	73	43	116	23.20	37.30	26.96
September 1	63	48	111	20.02	41.64	28.82

Total deaths for the four weeks ending July 28, 513; total deaths for the four weeks ending September 25, 499; total deaths for the eight weeks July 1 to September 25, 1012; total deaths for the nine weeks July 1, September 1, 1124; average number of deaths for the months of July and August, 562.

An actual examination of the record shows that the total number of deaths in July were 572; and that the actual mortality of August was 531.

The mortality in New Orleans during the first eight months of 1883 has been as follows:

	Total Deaths.		Total Deaths.
January	607	May	666
February	607	June	654
March	734	July	572
April	713	August	531

Total deaths six months 3981.

Total deaths first eight months of 1883, 5084.

We observe therefore that the lowest monthly mortality has occurred during the months of July and August, the hottest and dryest months of 1883, and the lowest mortality has been attained during the month of August, when the deaths numbered only 531.

MORTALITY FROM SMALL-POX DURING THE FIRST EIGHT MONTHS OF 1883.

The progress of the small-pox of 1883, will be illustrated by the following table:

DEATHS FROM SMALL-POX IN THE CITY OF NEW ORLEANS, DURING THE FIRST EIGHT MONTHS OF 1883.

MONTHS.	Deaths from Small-pox.		Total Deaths from Small-pox.
	White.	Colored.	White & Colored.
January	24	52	76
February	48	83	131
March	72	147	219
April	102	159	261
May	80	95	175
June	53	96	149
July	44	40	84
August	31	36	67

Total deaths from small-pox during the first six months of 1883, whites 379; colored 634. Total whites and colored 1013.

Average number of deaths from small-pox, during the first six months of 1883, 168.8.

Total deaths from small-pox during the months of July and August 1883, whites, 75; colored 76. Total 151. Average number of deaths during the months of July and August from small-pox 75.15.

Total deaths from small-pox during the first eight months of 1883, 1164.

Average number of deaths per month during 1883, first eight months, 145.5.

It is evident therefore that the small-pox has decreased one-half during the months of July and August.

But this foul disease is still in our city, and demands the most earnest and careful consideration at the hands of the Board of Health and the City Council.

A sufficient corps of physicians, not less than one to each ten thousand inhabitants, should be at once appointed and properly paid to execute a careful house-to-house inspection and vaccination.

Vaccination should be personally urged upon each inhabitant, by the experienced and trusted local practitioners of each division.

Twenty physicians at $50 per month, $1000.

Service of twenty physicians at $50 per month, for five months, October, November, December, January, February, $5000.

Vaccine matter $5 per month to each physician, twenty physicians, $100 per month. Total cost of vaccine matter $500.

The most experienced and popular physicians should be appointed in the districts in which they reside, and they should be required to make a careful census of the district, giving the following data:

Inhabitants: Whites, colored. Total whites and colored.

Number of inhabitants who have had small-pox: Whites, colored.

Total number of inhabitants who have been vaccinated previous to census: Whites, colored.

Total number of inhabitants unvaccinated: Whites, colored.

Number vaccinated (primary) by inspector: Whites, males, females. Total—Colored, males, females. Total—.

Re-vaccinations by inspector: Whites, males, females. Total—Colored, males, females. Total—.

Number of those who refuse vaccination: Whites, males, females. Total—Colored, males, females. Total—.

A careful list of all persons, with their exact residences and places of business, who refuse vaccination, should be kept.

This list should be classified after the completion of the canvass in each district, and the homes, residence and occupations of all those refusing vaccination, should be published for the information and protection of the public.

In this manner employes, heads of factories and heads of families would be warned as to the existence of dangerous and unprotected elements in their midst.

Some laws should be enacted against all vessels or railroads bringing cases of small-pox into New Orleans.

The entire police of this city should be instructed to arrest all persons found with small-pox on them wandering in the streets, and immediately send them to the small-pox hospital.

If the proper funds were placed at the disposal of the Board of Health to execute the foregoing plan, much would be accomplished to eradicate this disease; the act of 1877 empowers the Board of Health to execute the necessary rules and regulations with reference to vaccination, provided that it be not made compulsory.

The preceding measures, proposed by the President, were discussed and warmly advocated by Col. I. N. Marks and Col. A. W. Bosworth, and Dr. Felix Formento introduced the following resolution, which was unanimously adopted:

Resolved, That a medical officer be appointed by this Board of Health for each ward of the city, whose duties shall be to visit personally every house in his ward, and to urge the necessity of immediate vaccination, and vaccination of any person liable to contract the disease living in it, and making distinct statements of the results of his investigation in accordance with the plan suggested by the President of the Board of Health.

Resolved, That the city authorities be requested to appropriate sufficient funds in order to defray the necessary expense, such as salary of physicians, supply of vaccine matter, etc.

In accordance with the preceding action of the Board of Health the following communication was addressed to His Honor Wm. J. Behan, Mayor of the city of New Orleans, on the tenth of September 1883.

OFFICE BOARD OF HEALTH, STATE OF LOUISIANA,
New Orleans, September 10, 1883.

Hon. W. J. Behan, Mayor of New Orleans, City Hall:

Sir—I have the honor to enclose for the consideration of your Honor and the honorable the Common Council of New Orleans, extract from the minutes of the Board of Health, and resolutions unanimously adopted relative to the suppression of small pox.

During the past eight months of 1883, one thousand one hundred and sixty-four citizens of New Orleans have perished from small-pox. The monthly deaths caused by small-pox are as follows: January 76, February 131, March 219, April 261, May 175, June 149, July 84, August 67. The total deaths from all causes including small-pox in New Orleans, during the same period, was 5084. Small-pox has therefore caused nearly one-fourth of all the deaths occurring in New Orleans in 1883.

From the preceding statistics, it is evident that small-pox, has decreased to a marked extent during the months of July and August, and that the present is auspicious for the institution of measures for its arrest.

The plan which I proposed, and which was endorsed by the Board of Health, was briefly to appoint one physician for each ten thousand inhabitants, who should visit every place of business or factory and each habitation, and urge vaccination upon each citizen. A careful census to be made, embracing number of inhabitants, number protected by preceding attacks of small-pox, by vaccination and re-vaccination, and therefore the number refusing to be vaccinated and liable to and unprotected from the disease.

This work should be continued during the months of October, November, December, January, February and March, or until the thorough canvass of the city had been made, and the offer of free vaccination had been made to, and urged upon, every citizen.

The cost of twenty physicians at $50 each per month would be $1000 per month or $6000 per six months. The extended and vital operations of quarantine as well as the important duties connected with the registration of births, deaths and marriages, together with the various sanitary operations of importance, as inspection disinfection, and the promulgation by weekly and annual publications of the mortuary and sanitary operations, absorb the available resources of the Board of Health.

It is therefore essential that the Municipal Government should make the necessary appropriation for the protection of its citizens from this destructive pestilence.

The matter of finance could be conducted in the same manner to that now employed in city sanitation by the Board of Health: each physician's name to be entered upon the pay roll, and said roll to be submitted to the Honorable Common Council and paid by special ordinance. In this manner the work could be stopped, and the expense closed as soon as the city had been inspected, and the vaccination urged upon every citizen and inhabitant.

If I am correctly informed, your honorable body has already expended during 1883, up to August 31, $14,094 for the support of Small-Pox Hospitals: how much more will be required to meet other expenses cannot be estimated.

It would be difficult to estimate the cost, the loss of business, etc. If the value of each human life be rated at the moderate sum of one thousand dollars, then during the eight months of 1883, New Orleans has lost by small-pox (a preventable pestilence) $1,164,000.

(Signed) JOSEPH JONES, M. D.,
President Board of Health, State of Louisiana.

The opposition to vaccination was referable to several causes such as:

1. Ignorance, superstition and prejudice.
2. Stupid and malicious opposition to all measures emanating from the Board of Health for the protection of the health and lives of the people.
3. Disbelief in the protective powers of vaccination.
4. A popular superstition that vaccination during the prevalence of small-pox tended to develope the disease in the person vaccinated.
5. The belief held by many people and by some physicians that the vaccine virus has degenerated since its introduction by Edward Jenner in 1798.
6. The frequent failure of the bovine virus furnished by the various vaccine farms of the United States.
7. The dread of contracting syphilis, phthisis, erysipelas, scrofula and leprosy, through the medium of the vaccine virus.
8. The dread of contracting various diseases of animal origin, through the medium of the *bovine virus.*

These statements, but more especially the 3d, 4th, 5th, 6th, 7th and 8th, propositions, demand careful investigation.

The difficulty of procuring reliable vaccine matter during the recent civil war as well as the remarkable abnormal phenomena presented by the vaccine disease in some cases amongst the Confederate (Southern) Army, led the author to institute an extended investigation of all subjects bearing upon vaccination; and it is believed to be of paramount importance that the results of these labors should now be fully recorded.

Conceiving that the entire investigation could not be perfected without a full and careful persual of the original works of Edward Jenner; and, as after the most diligent search for many years in the book stores and libraries of the United States, the author was unable to procure or examine these immortal productions, he conducted a similar search amongst the book-stores of Paris, London, Edinburgh, Oxford, Liverpool, and Canarvan, Wales, during a visit to Europe in 1870.

After diligent personal search amongst the book stores of London, I succeeded in obtaining three copies of the works of Edward Jenner, namely: "Inquiry into the causes and effects of the variolæ vaccinæ, a disease discovered in some of the Western counties of England particularly Gloucestershire, and known by the name of The Cow-Pox. By Edward Jenner, M. D. F. R. S. etc.," published in London, June 1798. "Further observations on the variolæ vaccinæ," published in London in 1800, in connection with his "Inquiry into the cause and effects of the variolæ vaccinæ." "A continuation of facts and observations relative to the variolæ vaccinæ or cow-pox, by Edward Jenner, M. D. F. R. S. and L. S. etc., London 1800."

Jenner published a third edition of his works in 1801; which was essentially the same as the second edition published in 1800, and contained three distinct papers, namely:

"An inquiry into the causes and effects of the variolæ vaccinæ."

"Further observation on the variolæ vaccinæ."

"A continuation of facts and observations relative to the variolæ vaccinæ."

We have, after careful consideration of the grave situation, arrived at the firm conviction, that the public welfare demands, that at this time, when small-pox prevails in the Delta of the Mississippi, and in the commercial metropolis of the Valley, and when, at the same time, mistrust as to the efficacy of vaccination, is manifested by the people and by a portion of the medical profession, *that the original works of Edward Jenner should be reproduced in Louisiana.*

We have selected the third edition of the works of Edward Jenner, published in London in 1801, because we find, upon careful comparison of the three editions, published respectively in 1798, 1800 and 1801; that the latter appears to have received the most careful revision by the author.

The second edition, published in 1800, has written upon the fly-leaves N. Prythorch, Surgeon Carmarthen 1800, December 16; Robert Marsh Williams, seventeenth March, 1841. The corrections have been written at the proper places, in the separate memoirs.

The name of Richard Pearson is written across the title page of the third edition.

I have selected the plates from the first edition published in 1798, because the impressions are better defined, and colored with more care, than those of the second and third editions, the identical plates appearing to have been used in the printing of the three editions. Jenner gives four plates, all illustrative of, and included in, his orginal "inquiry into the causes and effects of the variolæ vaccinæ." The first plate facing page thirty-two, showing the appearance of the hand of a dairy maid, (Sarah Nelmes, Case xvi,) infected with the cow-pox from her masters cows in May 1796, is given in full: the second, third and fourth plates (Case xviii p. 36; Case xx. p. 38; Case xxi. p . 40), have been placed upon a single plate, as it appeared to be a useless expense to reproduce the mere outlines of the arms, these portions showing nothing of note as far as the process and effects of vaccination were concerned.

The following is the title and preface to the first edition of the inquiry of Dr. Edward Jenner.

"An *Inquiry* into the causes and effects of the variolæ vaccinæ, a disease discovered in some of the western counties of England, particularly Gloucestershire, and known by the name of The Cow-Pox. By Edward Jenner M. D. F. R. S., &c.

Quid Nobis Certius Ipsis Sensibus Esse Potest, Quo Vera ac Falsa Notemus Lurcretius.

London, printed for the author by Sampson Low, No. 7 Berwick stree
Soho.

And sold by Law, Ave-Maria Lane; and Murray and Highley, Flee
street, 1798."

TO C. H. PARRY, M. D., AT BATH.

My Dear Friend—In the present age of scientific investigation, it is remarkable that a disease of so peculiar a nature as the cow-pox, which has appeared in this and some of the neighboring counties for such a series o years, should so long have escaped particular attention. Finding the prevailing notions on the subject, both among men of our profession and others, extremely vague and indeterminate, and conceiving that facts might appear at once both curious and useful, I have instituted as strict an inquiry into the causes and effects of this singular malady as local circumstances would admit.

The following pages are the result, which, from motives of the most affectionate regard, are dedicated to you, by

Your sincere friend, EDWARD JENNER.

Berkley, Gloucestershire. June 21, 1798.

AN INQUIRY

— INTO —

THE CAUSES AND EFFECTS

— OF THE —

VARIOLÆ VACCINÆ,

A DISEASE DISCOVERED IN SOME OF THE WESTERN COUNTIES OF ENGLAND PARTICULARLY GLOUCESTERSHIRE, AND KNOWN BY THE NAME OF

THE COW POX.

—BY—

EDWARD JENNER, M. D. F. R. S. &C

> ——QUID NOBIS CERTIUS IPSIS
> SENSIBUS ESSE POTEST, QUO VERA AC FALSA NOTEMUS
>
> LUCRETIUS.

THE THIRD EDITION.

:o:

LONDON:
PRINTED FOR THE AUTHOR,
By D. N. Shury, No. 7, Berwick street, Soho;
And Sold by Hurst, Paternoster Row; Murray & Highley, Fleet Street; Carpenter
Old Bond Street; and Callow, Crown Court.
1801.

TO THE KING.

Sir—When I first addressed the public on a physiological subject, which I conceived to be of the utmost importance to the future welfare of the human race, I could not presume, in that early stage of the investigation, to lay the result of my inquiries at your Majesty's feet.

Subsequent inquiries instituted not only by myself but by men of the first rank in the medical profession have now confirmed the truth of the theory which I first made known to the world.

Highly honored by the permission to dedicate the result of my inquiries to your Majesty, I am emboldened to solicit your gracious patronage of a discovery which reason fully authorizes me to suppose will prove peculiarly conducive to the preservation of the lives of mankind.

To a Monarch no less justly than emphatically styled the Father of his people, this treatise is inscribed with perfect propriety; for, conspicuous as your Majesty's patronage has been of arts, of sciences and of commerce, yet the most distinguished feature of your character is your paternal care for the dearer interests of humanity.

I am, sir, with the most profound respect, your Majesty's most devoted subject and servant,

EDWARD JENNER.

Berkeley, Gloucestershire, December 20, 1799.

AN INQUIRY, &C., &C.

The deviation of man from the state in which he was originally placed by nature, seems to have proved to him a prolific source of diseases. From the love of splendor, from the indulgences of luxury, and from his fondness for amusement, he has familiarized himself with a great number of animals which may not originally have been intended for his associates.

The wolf, disarmed of ferocity, is now pillowed in the lady's lap.* The cat, the little tiger of our island, whose natural home is the forest, is equally domesticated and caressed. The cow, the hog, the sheep, and the horse, are all, for a variety of purposes, brought under his care and dominion.

There is a disease to which the horse, from his state of domestication, is frequently subject. The farriers have termed it *the Greafe*. It is an inflammation and swelling in the heel, accompanied at its commencement with small cracks or fissures, from which issues a limpid fluid, possessing properties of a very peculiar kind. This fluid seems capable of generating a disease in the human body, (after it has undergone the modification I shall presently speak of), which bears so strong a resemblance to small pox that I think it highly probable that it may be the source of that disease.

In this dairy county a great number of cows are kept, and the office of milking is performed indiscriminately by men and maid servants. One of the former having been appointed to apply dressings to the heels of a horse affected with the malady I have mentioned, and not paying due attention to cleanliness, incautiously bears his part in milking the cows, with some particles of the infectious matter adhering to his fingers. When this is the case it frequently happens that a disease is communicated to the cows, and from the cows to the dairy maids, which spreads through the farm until most of the cattle and domestics feel its unpleasant consequences. This disease has obtained the name of *cow pox*. It appears on the nipples of the cows in the form of irregular pustules. At their first appearance they are commonly of a palish blue, or rather of a color somewhat approaching to livid, and are surrounded by an inflammation. These pustules, unless a timely remedy be applied, frequently degenerate into phagedenic ulcers, which prove extremely troublesome.† The animals become indisposed, and the secretion of the milk is much lessened. Inflamed spots now begin to appear on different parts of the hands of the domestics employed in milking, and sometimes on the wrists, which run on to suppuration, first assuming the appearance of the small vesications produced by a burn. Most commonly they appear about the joints of the fingers and at their extremities, but whatever parts are affected, if the ation will admit, these superficial suppurations put on a circular form, their edges more elevated than their centre, and of a color distantly aching to blue. Absorption takes place and tumors appear in each

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late Mr. John Hunter proved by experiments that the dog is the wolf in a degenerated state.

y who attend sick cattle in this country find a speedy remedy for stopping the progress of this aint in those applications which act chemically upon the morbid matter, such as the solutions of the um zinci, the vitriolum cupri, etc.

axilla. The system becomes affected, the pulse is quickened; shiverings, succeeded by heat, general lassitude and pains about the loins and limbs, with vomiting, come on. The head is painful, and the patient is now and then affected with delirium.[*] These symptoms, varying in their degrees of violence, generally continue from one day to three or four, leaving ulcerated sores about the hands, which, from the sensibility of the parts, are very troublesome and commonly heal slowly, frequently becoming phagedenic, like those from whence they sprung. During the progress of the disease, the lips, nostrils, eyelids, and other parts of the body, are sometimes affected with sores; but these evidently arise from their being heedlessly rubbed or scratched with the patient's infected fingers. No eruptions on the skin have followed the decline of the feverish symptoms in any instance that has come under my inspection, one only excepted, and in this case a very few appeared on the arms. They were very minute, of a vivid red color, and soon died away, without advancing to maturation, so that I cannot determine whether they had any connection with the preceding symptoms.

Thus the disease makes its progress from the horse, as I conceive, to the nipple of the cow, and from the cow to the human subject.

Morbid matter of various kinds, when absorbed into the system, may produce effects in some degree similar; but what renders the cow pox virus so extremely singular is that the person who has been thus affected is forever after secure from the infection of the small pox; neither exposure to the variolous effluvia nor the insertion of the matter into the skin producing this distemper.

In support of so extraordinary a fact, I shall lay before my reader a great number of instances. But first it is necessary to observe that pustulous sores frequently appear spontaneously on the nipples of the cows, and instances have occurred, though very rarely, of the hands of the servants employed in milking being affected with sores in consequence, and even of their feeling an indisposition from absorption. These pustules are of a much milder nature than those which arise from that contagion which constitutes the true cow pox. They are always free from the bluish or livid tint so conspicuous in the pustules in that disease. No erysipelas attends them, nor do they show any phagedenic disposition, as in the other case, but quickly terminate in a scab, without creating any apparent disorder in the cow. This complaint appears at various seasons of the year, but most commonly in the spring, when the cows are first taken from their winter food and fed with grass. It is very apt to appear also when they are suckling their young. But this disease is not to be considered as similar in any respect to that of which I am treating, as it is incapable of producing any specific effects on the human constitution. However, it is of the greatest consequence to point it out here, lest the want of discrimination should occasion an idea of security from the infection of the small pox, which might prove delusive.

CASE I.

Joseph Merrett, now an under gardener to the Earl of Berkeley, lived as a servant with a farmer near this place, in the year 1770, and occasionally assisted in milking his master's cows. Several horses belonging to the farm began to have sore heels, which Merrett frequently attended. The cows soon became affected with the cow-pox, and soon after several sores appeared on his hands. Swellings and stiffness in each axilla followed, and he was so much indisposed for several days as to be incapable of pursuing his ordinary employment. Previously to the appearance of the distemper among the cows there was no fresh cow brought into the farm, nor any servant employed who was affected with the cow-pox.

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[*] It will appear in the sequel that these symptoms arise principally from the irritation of the sores, and not from the primary action of the vaccine virus upon the constitution.

In April, 1795, a general inoculation taking place here, Merrett was inoculated with his family, so that a period of twenty-five years had elapsed from his having the cow-pox to this time. However, though the variolous matter was repeatedly inserted into his arm, I found it impracticable to infect him with it, an efflorescence only, taking on an erysipelatous look about the centre, appearing on the skin near the punctured parts. During the whole time that his family had the small-pox, one of whom had it very full, he remained in the house with them, but received no injury from exposure to the contagion.

It is necessary to observe that the utmost care was taken to ascertain, with the most scrupulous precision, that no one whose case is here adduced had gone through the small-pox previous to these attempts to produce that disease.

Had these experiments been conducted in a large city, or in a populous neighborhood, some doubts might have been entertained; but here, where population is thin, and where such an event as a person's having had the small-pox is always faithfully recorded, no risk of inaccuracy in this particular can arise.

CASE II.

Sarah Portlock, of this place, was infected with the cow-pox, when a servant at a farmer's in the neighborhood, twenty-seven years ago.*

In the year 1792, conceiving herself, from this circumstance, secure from the infection of the small-pox, she nursed one of her own children, who had accidentally caught the disease, but no indisposition ensued. During the time she remained in the infected room, variolous matter was inserted into her arms, but without any further effect than in the preceding case.

CASE III.

John Phillips, a tradesman of this town, had the cow-pox at so early a period as nine years of age. At the age of sixty-two I inoculated him, and was very careful in selecting matter in its most active state. It was taken from the arm of a boy just before the commencement of the eruptive fever, and instantly inserted. It very speedily produced a sting-like feel in the part. An efflorescence appeared, which on the fourth day was rather extensive, and some degree of pain and stiffness was felt about the shoulder; but on the fifth day these symptoms began to disappear, and in a day or two after went entirely off, without producing any effect on the system.

CASE IV.

Mary Barge, of Woodford, in this parish, was inoculated with variolous matter in the year 1791. An efflorescence of a palish red color soon appeared about the parts where the matter was inserted, and spread itself rather extensively, but died away in a few days without producing any variolous symptoms.† She has since been repeatedly employed as a nurse to small-pox patients without experiencing any ill consequences. This woman had the cow-pox when she lived in the service of a farmer in this parish thirty-one years before.

CASE V.

Mrs. H——, a respectable gentlewoman of this town, had the cow-pox when very young. She received the infection in a manner that is not common. It was given by means of her handling some of the same utensils* which were in use among the servants of the family, who had the disease from milking infected cows. Her hands had many of the cow-pox sores upon them, and they were communicated to her nose, which became inflamed and very much swollen. Soon after this event Mrs. H——— was exposed to the contagion of the small-pox, where it was scarcely possible for her to have escaped, had she been susceptible of it, as she regularly attended a relative who had the disease in so violent a degree that it proved fatal to him.

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*I have purposely selected several cases in which the disease had appeared at a very distant period previous to the experiments made with variolous matter, to show that the change produced in the constitution is not affected by time.

†It is remarkable that variolous matter, when the system is disposed to reject it, should excite inflammation on the part to which it is applied more speedily than when it produces the small-pox. Indeed, it becomes almost a criterion by which we can determine whether the infection will be received or not. It seems as if a change, which endures through life, had been produced in the action, or disposition to action, in the vessels of the skin; and it is remarkable, too, that whether this change has been effected by the small-pox or the cow-pox that the disposition to sudden cuticular inflammation is the same on the application of variolous matter.

In the year 1778 small-pox prevailed very much at Berkeley, and Mrs. H———, not feeling perfectly satisfied respecting her safety (no indisposition having followed her exposure to the small-pox), I inoculated her with active variolous matter. The same appearance followed as in the preceding cases—an efflorescence on the arm, without any effect on the constitution.

CASE VI.

It is a fact so well known among our dairy farmers, that those who have had the small-pox either escape the cow-pox or are disposed to have it slightly, that as soon as the complaint shows itself among the cattle, assistants are procured, if possible, who are thus rendered less susceptible of it, otherwise the business of the farm could scarcely go forward.

In the month of May, 1796, the cow-pox broke out at Mr. Baker's, a farmer who lives near this place. The disease was communicated by means of a cow, which was purchased in an infected state at a neighboring fair, and not one of the farmer's cows, consisting of thirty, which were at that time milked, escaped the contagion. The family consisted of a man servant, two dairy maids and a servant boy, who, with the farmer himself, were twice a day employed in milking the cattle. The whole of this family, except Sarah Wynne, one of the dairymaids, had gone through the small-pox. The consequence was that the farmer and the servant boy escaped the infection of the cow-pox entirely, and the servant man and one of the maid servants had each of them nothing more than a sore on one of their fingers, which produced no disorder in the system. But the other dairy maid, Sarah Wynne, who never had the small-pox, did not escape in so easy a manner. She caught the complaint from the cows, and was affected with the symptoms described in the fifth page in so violent a degree that she was confined to her bed, and rendered incapable for several days of pursuing her ordinary vocations in the farm.

March 28th, 1797, I inoculated this girl, and carefully rubbed the variolous matter into slight incisions made upon the left arm. A little inflammation appeared in the usual manner around the parts where the matter was inserted, but so early as the fifth day it vanished entirely without producing any effect on the system.

CASE VII.

Although the preceding history pretty clearly evinces that the constitution is far less susceptible of the contagion of the cow-pox after it has felt that of the small-pox, and although in general, as I have observed, they who have had the small-pox, and are employed in milking cows which are infected with the cow-pox, either escape the disorder, or have sores on the hands without feeling any general indisposition, yet the animal economy is subject to some variation in this respect, which the following relation will point out:

In the summer of the year 1796 the cow-pox appeared at the farm of Mr. Andrews, a considerable dairy adjoining to the town of Berkeley. It was communicated, as in the preceding instance, by an infected cow purchased at a fair in the neighborhood. The family consisted of the farmer, his wife, two sons, a man and a maid servant, all of whom, except the farmer, who was fearful of the consequences, bore a part in milking the cows. The whole of them, exclusive of the man servant, had regularly gone through the small-pox; but in this case no one who milked the cows escaped the contagion. All of them had sores upon their hands, and some degree of general indisposition, preceded by pains and tumors in the axilla; but there was no comparison in the severity of the disease as it was felt by the servant man, who had escaped the small-pox, and by those of the family who had not; for, while he was confined to his bed, they were able, without much inconvenience, to follow their ordinary business.

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*When the cow-pox has prevailed in the dairy, it has often been communicated to those who have not milked the cows by the handle of the milk pail.

February 13, 1797, I availed myself of an opportunity of inoculating William Rodway, the servant man above alluded to. Variolous matter was inserted into both his arms: in the right by means of superficial incisions, and into the left by slight punctures into the cutis. Both were perceptibly inflamed on the third day. After this the inflammation about the punctures soon died away, but a small appearance of erysipelas was manifest about the edges of the incisions till the eighth day, when a little uneasiness was felt for the space of half an hour in the right axilla. The inflammation then hastily disappeared, without producing the most distant mark of affection of the system.

CASE VIII.

Elizabeth Wynne, aged fifty-seven, lived as a servant with a neighboring farmer thirty-eight years ago. She was then a dairy maid, and the cow-pox broke out among the cows. She caught the disease with the rest of the family, but, compared with them, had it in a very slight degree, one very small sore only breaking out on the little finger of her left hand, and scarcely any perceptible indisposition following it.

As the malady had shown itself in so slight a manner, and as it had taken place at so distant a period of her life, I was happy with the opportunity of trying the effects of variolous matter upon her condition, and on the twenty-eighth of March, 1797, I inoculated her by making two superficial incisions on the left arm, on which the matter was cautiously rubbed. A little efflorescence soon appeared, and a tingling sensation was felt about the parts, where the matter was inserted, until the third day, when both began to fade, and so early as the fifth day it was evident that no indisposition would follow.

CASE IX.

Although the cow-pox shields the constitution from the small-pox, and the small-pox proves a protection against its own future poison, yet it appears that the human body is again and again susceptible of the infectious matter of the cow-pox, as the following history will demonstrate:

William Smith, of Pyrton, in this parish, contracted this disease when he lived with a neighboring farmer in the year 1780. One of the horses belonging to the farm had sore heels, and it fell to his lot to attend him. By these means the infection was carried to the cows, and from the cows it was communicated to Smith. On one of his hands were several ulcerated sores, and he was affected with such symptoms as have been before described.

In the year 1791 the cow-pox broke out at another farm where he then lived as a servant, and he became affected with it a second time; and in the year 1794 he was so unfortunate as to catch it again. The disease was equally as severe the second and third time as it was on the first.*

In the spring of the year 1795 he was twice inoculated, but no affection of the system could be produced from the variolous matter; and he has since associated with those who had the small-pox in its most contagious state without feeling any effect from it.

CASE X.

Simon Nichols lived as a servant with Mr. Bromedge, a gentleman who resides on his own farm, in this parish, in the year 1782. He was employed in applying dressings to the sore heels of one of his master's horses, and at the same time assisted in milking the cows. The cows became affected in consequence, but the disease did not show itself on their nipples till several weeks after he had begun to dress the horse. He quitted Mr. Bromedge's service, and went to another farm, without any sores upon him; but here his hands soon began to be affected in the common way, and he was much indisposed, with the usual symptoms. Concealing the nature of the malady from Mr. Cole, his new master, and being there also employed in milking, the cow-pox was communicated to the cows.

Some years afterwards Nichols was employed in a farm where the small-pox broke out, when I inoculated him with several other patients, with whom he continued during the whole time of their confinement. His arm inflamed, but neither the inflammation nor his associating with the inoculated family produced the least effect upon his constitution.

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*This is not the case in general—a second attack is commonly very slight, and so, I am informed, it is among the cows. The reader will find further observations on this subject in the sequel. These repeated indispositions must have arisen from the local irritation, and not from the specific action of the vaccine virus.

CASE XI.

William Stinchcomb was a fellow servant with Nichols at Mr. Bromedge's farm, at the time the cattle had the cow-pox, and he was unfortunately infected by them. His left hand was very severely affected with several corroding ulcers, and a tumor of considerable size appeared in the axilla of that side. His right hand had only one small sore upon it, and no tumor discovered itself in the corresponding axilla.

In the year 1792 Stinchcomb was inoculated with variolous matter, but no consequences ensued beyond a little inflammation in the arm for a few days. A large party were inoculated at the same time, some of whom had the disease in a more violent degree than is commonly seen from inoculation. He purposely associated with them, but could not receive the small-pox.

During the sickening of some of his companions their symptoms so strongly recalled to his mind his own fate when sickening with the cow-pox, that he very pertinently remarked their striking similarity.

CASE XII.

The paupers of the village of Tortworth, in this county, were inoculated by Mr. Henry Jenner, surgeon, of Berkeley, in the year 1795. Among them eight patients presented themselves who had at different times in their lives had the cow-pox. One of them, Hester Walkley, I attended with that disease when he lived in the service of a farmer in the same village in the year 1782; but neither this woman, nor any other of the patients who had gone through the cow-pox, received the variolous infection either from the arm or from mixing in the society of the other patients who were inoculated at the same time. This state of security proved a fortunate circumstance, as many of the poor women were at the same time in a state of pregnancy.

CASE XIII.

One instance has occurred to me of the system being affected from the matter issuing from the heels of horses, and of its remaining afterwards unsusceptible of the variolous contagion; another, where the small-pox appeared obscurely; and a third in which its complete existence was positively ascertained.

First, Thomas Pearce is the son of a smith and farrier near to this place. He never had the cow-pox, but in consequence of dressing horses with sore heels at his father's, when a lad, he had sores on his fingers, which suppurated, and which occasioned a pretty severe indisposition. Six years afterwards I inserted variolous matter into his arm repeatedly, without being able to produce anything more than a slight inflammation, which appeared very soon after the matter was applied, and afterwards I exposed him to the contagion of the small-pox with as little effect[*]

CASE XIV.

Secondly, Mr. James Cole, a farmer in this parish, had a disease from the same source as related in the preceding case, and some years after was inoculated with variolous matter. He had a little pain in the axilla, and felt a slight indisposition for three or four hours. A few eruptions showed themselves on the forehead, but they very soon disappeared without advancing to maturation.

CASE XV.

Although in the two former instances the system seemed to be secured, or nearly so, from variolous infection by the absorption of matter from sores produced by the diseased heels of horses, yet the following case renders it probable that this cannot be entirely relied upon until a disease has been generated by the morbid matter from the horse on the nipple of the cow, and passed through that medium to the human subject.[†]

Mr. Abraham Riddiford, a farmer at Stone, in this parish, in consequence of dressing a mare that had sore heels, was affected with very painful sores in both his hands, tumors in each axilla, and severe and general indisposition. A surgeon in the neighborhood attended him, who, knowing the similarity between the appearance of the sores upon his hands and those produced by the cow-pox, and being acquainted also with the effects of that disease on the human constitution, assured him that he never need to fear the infection of the small-pox; but this assertion proved fallacious, for, on being exposed to the infection upwards of twenty years afterwards, he caught the disease, which took its regular course in a very mild way. There certainly was a difference perceptible, although it is not easy to describe it, in the general appearance of the pustules from that which we commonly see. Other practitioners, who visited the patient at my request, agreed with me in this point, though there was no room left for suspicion as to the reality of the disease, as I inoculated some of his family from the pustules, who had the small-pox, with its usual appearances, in consequence.

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[*] It is a remarkable fact, and well known to many, that we are frequently foiled in our endeavors to communicate the small-pox by inoculation to blacksmiths, who in the country are farriers. They often, as in the above instance, either resist the contagion entirely, or have the disease anomalously. Shall we not be able now to account for this on a rational principle?

[†] The succeeding part will give further explanations of this subject.

CASE XVI.

Sarah Nelmes, a dairy maid at a farmer's near this place, was infected with the cow-pox from her master's cows, in May, 1796. She received the infection on a part of the hand which had been previously, in a slight degree, injured by a scratch from a thorn. A large, pustulous sore, and the usual symptoms accompanying the disease, were produced in consequence. The pustule was so expressive of the true character of the cow-pox, as it commonly appears upon the hand, that I have given a representation of it in the annexed plate. The two small pustules on the wrists arose also from the application of the virus to some minute abrasions of the cuticle, but the livid tint, if they ever had any, was not conspicuous at the time I saw the patient. The pustule on the fore-finger shows the disease in an earlier stage. It did not actually appear on the hand of this young woman, but was taken from that of another, and is annexed for the purpose of representing the malady after it has newly appeared.

CASE XVII.

The more accurately to observe the progress of the infection, I selected a healthy boy, about eight years old, for the purpose of inoculation for the cow-pox. The matter was taken from a sore on the hand of a dairy maid*, who was infected by her master's cows, and it was inserted on the fourteenth of May, 1796, into the arm of the boy, by means of two superficial incisions, barely penetrating the cutis, each about half an inch long.

On the seventh day he complained of uneasiness in the axilla, and on the ninth he became a little chilly, lost his appetite, and had a slight headache. During the whole of this day he was perceptibly indisposed, and spent the night with some degree of restlessness, but on the following day he was perfectly well.

The appearance of the incisions in their progress to a state of maturation were much the same as when produced in a similar manner by variolous matter.† The only difference which I perceived was in the state of the limpid fluid arising from the action of virus, which assumed rather a darker hue, and in that of the afflorescence spreading round the incisions, which had more of an erysipelatous look than we commonly perceive when variolous matter has been made use of in the same manner; but the whole died away (leaving on the inoculated parts scabs and subsequent scars) without giving me or my patient the least trouble.

In order to ascertain whether the boy, after feeling so slight an affection of the system from the cow-pox virus, was secure from the contagion of the small-pox, he was inoculated the first of July following with variolous matter, immediately taken from a pustule. Several slight punctures and incisions were made on both his arms, and the matter was carefully inserted, but no disease followed. The same appearances were observable on the arms as we commonly see when a patient has had variolous matter applied, after having either the cow-pox or the small-pox. Several months afterwards he was again inoculated with variolous matter, but no sensible effect was produced on the constitution.

Here my researches were interrupted till the spring of the year 1798, when, from the wetness of the early part of the season, many of the farmer's horses in this neighborhood were affected with sore heels, in consequence of which the cow-pox broke out among several of our dairies, which afforded me an opportunity of making farther observations upon this curious disease.

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*From the sore on the hand of Sarah Nelmes.—See the preceding case and the plate.

†This appearance was, in a great measure, new to me, and I ever shall recollect the pleasant sensations it excited; as, from its similiarity to the pustule produced by variolous inoculation, it incontestibly pointed out the close connection between the two diseases, and almost anticipated the result of my future experiments.

A mare, the property of a person who keeps a dairy in a neighboring parish, began to have sore heels the latter end of the month of February, 1798, which were occasionally washed by the servant men of the farm. Thomas Virgoe, William Wherret and William Haynes, who, in consequence became affected with sores in their hands, followed by inflamed lymphatic glands in the arms and axilla, shiverings succeeded by heat, lassitude and general pains in the limbs. A single paroxysm terminated the disease, for within twenty-four hours they were free from general indisposition, nothing remaining but the sores on their hands. Haynes and Virgoe, who had gone through the small-pox from inoculation, described their feelings as very similar to those which affected them on sickening with that malady. Wherret never had had the small-pox. Haynes was daily employed as one of the milkers at the farm, and the disease began to show itself among the cows about ten days after he first assisted in washing the mare's heels. Their nipples became sore in the usual way, with bluish pustules; but as remedies were early applied they did not ulcerate to any extent.

CASE XVIII.

John Baker, a child of five years old, was inoculated March 16, 1798, with matter taken from a pustule on the hand of Thomas Virgoe, one of the servants who had been infected from the mare's heels. He became ill on the sixth day with symptoms similar to those excited by cow-pox matter. On the eighth day he was free from indisposition.

There was some variation in the appearance of the pustule on the arm. Although it somewhat resembled a small-pox pustule, yet its similitude was not so conspicuous as when excited by matter from the nipple of the cow, or when the matter has passed from thence through the medium of the human subject. (See plate No. 2.)

This experiment was made to ascertain the progress and subseqent effects of the disease when thus propagated. We have seen that the virus from the horse, when it proves infectious to the human subject, is not to be relied upon as rendering the system secure from variolous infection, but that the matter produced by it on the nipple of the cow is perfectly so. Whether its passing from the horse through the human constitution, as in the present instance, will produce a similar effect, remains to be decided. This would now have been effected, but the boy was rendered unfit for inoculation, from having felt the effects of a contagious fever in a work house, soon after this experiment was made.

CASE XIX.

William Summers, a child of five years and a half old, was inoculated the same day with Baker, with matter taken from the nipples of one of the infected cows, at the farm alluded to in page 32. He became indisposed on the sixth day, vomited once, and felt the usual slight symptoms till the eighth day, when he appeared perfectly well. The progress of the pustule, formed by the infection of the virus, was similar to that noticed in Case XVII, with this exception—its being free from the livid tint observed in that instance.

CASE XX.

From William Summers the disease was transferred to William Pead, a boy of eight years old, who was inoculated March 28. On the sixth day he complained of pain in the axilla, and on the seventh was affected with the common symptoms of a patient sickening with the small-pox from inoculation, which did not terminate till the third day after the seizure. So perfect was the similarity to the variolous fever, that I was induced to examine the skin, conceiving there might have been some eruptions, but none appeared. The efflorescent blush around the part punctured in the boy's arm was so truly characteristic of that which appears on vario ous inoculation, that I have given a representation of it. The drawing was made when the pustule was beginning to die away, and the *areola* retiring from the centre. (See plate No. 3.)

CASE XXI.

April 5, several children and adults were inoculated from the arm of William Pead. The greater part of them sickened on the sixth day, and were well on the seventh, but in three of the number a secondary indisposition arose in consequence of an extensive erysipelatous inflammation which appeared on the inoculated arms. It seemed to arise from the state of the pustule, which spread out, accompanied with some degree of pain, to about half the diameter of a sixpence. One of these patients was an infant of half a year old. By the application of mercurial ointment to the inflamed parts (a treatment recommended under similar circumstances in the inoculated small-pox) the complaint subsided without giving much trouble.

Hannah Excell, a healthy girl of seven years old, and one of the patients above mentioned, received the infection from the insertion of the virus under the cuticle of the arm in three distinct points.* The pustules which arose in consequence so much resembled, on the ninth day, those appearing from the insertion of variolous matter, that an experienced inoculator would scarcely have discovered a shade of difference at that period. Experience now tells me that almost the only variation which follows consists in the pustulous fluids remaining limpid nearly to the time of its total disappearance, and not, as in the direct small-pox, becoming purulent. (See plate No. 4.)

CASE XXII.

From the arm of this girl matter was taken and inserted April 12 into the arms of John Marklove, one year and a half old.

Robert F. Jenner, eleven months old;

Mary Pead, five years old; and

Mary James, six years old.

Among these, Robert F. Jenner did not receive the infection. The arms of the other three inflamed properly, and began to affect the system in the usual manner; but, being under some apprehension from the preceding cases that a troublesome erysipelas might arise, I determined on making an experiment, with the view of cutting off its source. Accordingly, on the eighth day after the patients had felt an indisposition that was just perceptible, of about twelve hours, I applied in two of these cases out of the three, on the vesicle formed by the virus, a little mild caustic, composed of equal parts of quicklime and soap, and suffered it to remain on the part six hours.† It seemed to give the children but little uneasiness, and effectually answered my intention in preventing the appearance of erysipelas. Indeed, it seemed to do more, for in half an hour after its application, the indisposition of the children ceased.‡ These precautions were, perhaps, unnecessary, as the arm of the third child, Mary Pead, which was suffered to take its common course, scabbed quickly, without any erysipelas.‖

CASE XXIII.

From the child's arm matter was taken and transferred to that of J. Barge, a boy of seven years old. He sickened on the eight day, went through the disease with the usual slight symptoms, and without any inflammation on the arm beyond the common efflorescence surrounding the pustule, and appearance so often seen in inoculated small-pox.

After the many fruitless attempts to give the small-pox to those who had had the cow-pox, it did not appear necessary, nor was it convenient to me, to inoculate the whole of those who had been the subject of these late trials; yet I thought it right to see the effects of variolous matter on some of them, particularly William Summers, the first of these patients who had been infected with matter taken from the cow. He was therefore inoculated with variolous matter from a fresh pustule; but, as in the preceding cases, the system did not feel the effects of it in the smallest degree. I had an opportunity, also, of having this boy (Barge) and William Pead inoculated by my nephew, Mr. Henry Jenner, whose report to me is as follows: "I have inoculated Pead and Barge, two of the boys whom you lately infected with the cow-pox. On the second day the incisions were inflamed, and there was a pale, inflammatory stain around them. On the third day these appearances were still increasing, and their arms itched considerably. On the fourth day the inflammation was evidently subsiding, and on the sixth it was scarcely perceptible. No symptom of indisposition followed.

"To convince myself that the variolous matter made use of was in a perfect state, I at the same time inoculated a patient with some of it who had never gone through the cow-pox, and it produced the small-pox in the usual regular manner."

These experiments afforded me much satisfaction; they proved that the matter, in passing from one human subject to another, through five gradations, lost none of its original properties, J. Barge being the fifth who received the infection successively from William Summers, the boy to whom it was communicated from the cow.

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* This was not done intentionally, but from the accidental touch of the lancet, one puncture being always sufficient.

† Perhaps a few touches with the lapis septicus would have proved equally efficacious.

‡ What effect would a similar treatment produce in inoculation for the small-pox?

‖ The subsequent [illegible] of this treatise will sufficiently shew the proper practice in cases of inflammation [illegible]

I shall now conclude this inquiry with some general observations on the subject, and on some others which are interwoven with it.

Although, I presume, it may be unnecessary to produce further testimony in support of my assertion "that the cow-pox protects the human constitution from the infection of the small-pox," yet it affords me considerable satisfaction to say that Lord Somerville, the president of the Board of Agriculture, to whom this paper was shown by Sir Joseph Banks, has found, upon inquiry, that the statements were confirmed by the concurring testimony of Mr. Dollan, a surgeon, who resides in a dairy country remote from this, in which these observations were made. With respect to the opinion adduced "that the source of the infection is a peculiar morbid matter arising in the horse," although I have not been able to prove it from actual experiments conducted immediately under my own eye, yet the evidence I have adduced appears sufficient to establish it.

They who are not in the habit of conducting experiments may not be aware of the coincidence of circumstances necessary for their being managed so as to prove perfectly decisive; nor how often men engaged in professional pursuits are liable to interruptions which disappoint them almost at the instant of their being accomplished. However, I feel no room for hesitation respecting the common origin of the disease, being well convinced that it never appears among the cows (except it can be traced to a cow introduced among the general herd which has been previously infected, or to an infected servant), unless they have been milked by some one who, at the same time, has the care of a horse affected with diseased heels.

The spring of the year 1797, which I intended particularly to have devoted to the completion of this investigation, proved, from its dryness, remarkably averse to my wishes; for it frequently happens, while the farmer's horses are exposed to the cold rains which fall at that season, that their heels become diseased, and no cow-pox then appeared in the neighborhood.

The active quality of the virus from the horse's heels is greatly increased after it has acted on the nipples of the cow, as it rarely happens that the horse affects his dresser with sores, and as rarely that a milk maid escapes the infection when she milks infected cows. It is most active at the commencement of the disease, even before it has acquired a pus-like appearance; indeed, I am not confident whether this property in the matter does not entirely cease as soon as it is secreted in the form of pus. I am induced to think it does cease*, and that it is the thin, darkish-looking fluid only, oozing from the newly formed cracks in the heels, similar to what sometimes appears from erysipelatous blisters, which gives the disease. Nor am I certain that the nipples of the cow are at all times in a state to receive the infection. The appearance of the disease in the spring and the early part of the summer, when they are disposed to be affected with spontaneous eruptions, so much more frequently than at other seasons, induces me to think that the virus from the horse must be received upon them when they are in this state, in order to produce effects. Experiments, however, must determine these points. But it is clear that when the cow-pox virus is once generated that the cows cannot resist the contagion, in whatever state their nipples may chance to be, if they are milked with an infected hand.

Whether the matter, either from the cow or the horse, will affect the sound skin of the human body, I cannot positively determine; probably it will not, unless on those parts where the cuticle is extremely thin, as on the lips, for example. I have known an instance of a poor girl who produced an ulceration on her lip by frequently holding her finger to her mouth to cool the raging of a cow-pox sore by blowing upon it. The hands of the farmer's servants here, from the nature of their employments, are constantly exposed to those injuries which occasion abrasions of the cuticle, to punctures from thorns and such like accidents, so that they are always in a state to feel the consequences of exposure to infectious matter.

It is singular to observe that the cow-pox virus, although it renders the constitution unsusceptible of the variolous, should, nevertheless, leave it unchanged with respect to its own action. I have already produced an instance† to point this out, and shall now corroborate it with another.

Elizabeth Wynne, who had the cow-pox in the year 1759, was inoculated with variolous matter, without effect, in the year 1797, and again caught the cow-pox in the year 1798. When I saw her, which was on the eighth day after she received the infection, I found her affected with general lassitude, shiverings, alternating with heat, coldness of the extremities, and a quick and irregular pulse. These symptoms were preceded by a pain in the axilla. On her hand was one large, pustulous sore, which resembled that delineated in plate No. 1.*

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*It is very easy to procure pus from old sores on the heels of horses. This I have often inserted into scratches made with a lancet, on the sound nipples of cows, and have seen no other effects from it than simple inflammation.

†See case IX.

It is curious, also, to observe that the virus, which, with respect to its effects, is undetermined and uncertain previously to its passing from the horse through the medium of the cow,† should then not only become more active, but should invariably and completely possess those specific properties which induce in the human constitution symptoms similar to those of the variolous fever, and effect in it that peculiar change which forever renders it unsusceptible of the variolous contagion.

May it not then be reasonably conjectured that the source of the small-pox is morbid matter of a peculiar kind, generated by a disease in the horse, and that accidental circumstances may have again and again arisen, still working new changes upon it, until it has acquired the contagious and malignant form under which we now commonly see it making its devastations among us? And, from a consideration of the change which the infectious matter undergoes from producing a disease on the cow, may we not conceive that many contagious diseases now prevalent amongst us may owe their present appearance not to a simple, but to a compound, origin? For example, is it difficult to imagine that the measles, the scarlet fever, and the ulcerous sore throat with a spotted skin, have all sprung from the same source, assuming some variety in their forms according to the nature of their new combinations? The same question will apply respecting the origin of many other contagious diseases which bear a strong analogy to each other.

There are certainly more forms than one, without considering the common variation between the confluent and distinct, in which the small-pox appears in what is called the natural way. About seven years ago a species of small-pox spread through many of the towns and villages of this part of Gloucestershire. It was of so mild a nature that a fatal instance was scarcely ever heard of, and consequently so little dreaded by the lower orders of the community, that they scrupled not to hold the same intercourse with each other as if no infectious disease had been present among them. I never saw nor heard of an instance of its being confluent. The most accurate manner, perhaps, in which I can convey an idea of it is, by saying, that had fifty individuals been taken promiscuously and infected by exposure to this contagion, they would have had as mild and light a disease as if they had been inoculated with variolous matter in the usual way. The harmless manner in which it showed itself could not arise from any peculiarity either in the season or the weather, for I watched its progress upwards of a year without perceiving any variation in its general appearance. I consider it, then, as a variety of the small-pox.‡

In some of the preceding cases I have noticed the attention that was paid to the state of the variolous matter previous to the experiment of inserting it into the arms of those who had gone through the cow-pox. This I conceived to be of great importance in conducting these experiments and were it always properly attended to by those who inoculate for the small-pox, it might prevent much subsequent mischief and confusion. With the view of enforcing so necessary a precaution, I shall take the liberty of digressing so far as to point out some unpleasant facts, relative to mismanagement in this particular, which have fallen under my own observation.

A medical gentleman (now no more), who, for many years, inoculated in this neighborhood, frequently preserved the variolous matter intended for use, on a piece of lint or cotton, which, in its fluid state, was put into a vial, corked and conveyed into a warm pocket, a situation certainly favorable for speedily producing putrefaction in it. In this state (not unfrequently after it had been taken several days from the pustules), it was inserted into the arms of his patients, and brought on inflammation of the incised parts, swellings of the axillary glands, fever and sometimes eruptions. But what was this disease? Certainly not the small-pox, for the matter having from putrefaction lost or suffered a derangement in its specific properties, was no longer capable of producing that malady, those who had been inoculated in this manner being as much subject to the contagion of the small-pox as if they had never been under the influence of this artificial disease; and many, unfortunately, fell victims to it who thought themselves in perfect security. The same unfortunate circumstance of giving a disease, supposed to be the small-pox, with inefficaceous variolous matter, having occurred under the direction of some other practitioners within my knowledge, and probably from the same incautious method of securing the variolous matter, I avail myself of this opportunity of mentioning what I conceive to be of great importance, and, as a further cautionary hint, I shall again digress so far as to add another observation on the subject of inoculation.

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*As I have before observed, these symptoms probably arose from the irritation of the sore, which was very painful.

†Further explanation will be adduced on this subject.

‡My friend, Dr. Hicks, of Bristol, who, during the prevalence of this distemper, was resident at Gloucester, and physician to the hospital there, where it was seen soon after its first appearance in this country, had opportunities of making numerous observations upon it, which it is his intention to communicate to the public.

Whether it be yet ascertained by experiment that the quantity of variolous matter inserted into the skin makes any difference with respect to the subsequent mildness or violence of the disease, I know not; but I have the strongest reason for supposing that if either the punctures or incisions be made so deep as to go through it, and wound the adipose membrane, that the risk of bringing on a violent disease is greatly increased. I have known an inoculator, whose practice was "to cut deep enough (to use his own expression) to see a bit of fat," and there to lodge the matter. The great number of bad cases, independent of inflammations and abscesses on the arms, and the fatality which attended this practice was almost inconceivable, and I cannot account for it on any other principle than that of the matter being placed in this situation instead of the skin.

It was the practice of another, whom I well remember, to pinch up a small portion of the skin on the arms of his patients, and to pass through it a needle, with a thread attached to it, previously dipped in variolous matter. The thread was lodged in the perforated parts, and consequently left in contact with the cellular membrane. This practice was attended with the same ill success as the former. Although it is very improbable that any one would now inoculate in this rude way by design, yet these observations may tend to place a double guard over the lancet, when infants, whose skins are comparatively so very thin, fall under the care of the inoculator.

A very respectable friend of mine, Dr. Hardwicke, of Sodbury, in this county, inoculated great numbers of patients previous to the introduction of the more modern method by Sutton, and with such success that a fatal instance occurred as rarely as since that method has been adopted It was the doctor's practice to make as slight an incision as possible upon the skin, and there to lodge a thread saturated with the variolous matter. When his patients became indisposed, agreeably to the custom then prevailing, they were directed to go to bed, and were kept moderately warm. Is it not probable, then, that the success of the modern practice may depend more upon the method of invariably depositing the virus in or upon the skin than on the subsequent treatment of the disease?

I do not mean to insinuate that exposure to cool air, and suffering the patient to drink cold water when hot and thirsty, may not moderate the eruptive symptoms and lessen the number of pustules; yet, to repeat my former observation, I cannot account for the uninterrupted success, or nearly so, of one practitioner, and the wretched state of the patients under the care of another, where, in both instances, the general treatment did not differ essentially, without conceiving it to arise from the different modes of inserting the matter for the purpose of producing the disease. As it is not the identical matter inserted which is absorbed into the constitution, but that which is, by some peculiar process in the animal economy, generated by it, is it not probable that different parts of the human body may prepare or modify the virus differently? Although the skin, for example, adipose membrane, or mucous membranes, are all capable of producing the variolous virus by the stimulous given by the particles originally deposited upon them, yet I am induced to conceive that each of these parts is capable of producing some variation in the qualities of the matter previous to its affecting the constitution What else can constitute the difference between the small-pox when communicated casually, or in what has been termed the natural way, or when brought on artificially through the medium of the skin? After all are the varioulous particles, possessing their true specific and contagious principles, ever taken up and conveyed by the lymphatics unchanged into the blood vessels? I imagine not. Were this the case, should we not find the blood sufficiently loaded with them in some stages of the small-pox to communicate the disease by inserting it under the cuticle, or by spreading it on the surface in the shape of an ulcer? Yet experiments have determined the impracticability of its being given in this way, although it has been proved that variolous matter, when much diluted with water, and applied to the skin in the usual manner, will produce the disease. But it would be digressing beyond a proper boundary to go minutely into this subject here.

At what period the cow-pox was first noticed here is not upon record. Our eldest farmers were not unacquainted with it in their earliest days, when it appeared a their farms without any deviation from the phenomena which it now exhibits. I section with the small-pox seems to have been unknown to them. Probably eral introduction of inoculation first occasioned the discovery.

Its rise in this country may not have been of very remote date, as the practi ing cows might formerly have been in the hands of women only, which, I beli case now in some other dairy countries, and consequently that the cows mi former times have been exposed to the contagious matter brought by the from the heels of horses. Indeed, a knowledge of the source of the infecti the minds of most of the farmers in this neighborhood, but has at length produced good consequences, and it seems probable from the precautions they are now disposed to adopt that the appearance of the cow-pox here may either be entirely extinguished or become extremely rare.

Should it be asked whether this investigation be a matter of mere curiosity, or whether it tend to any benefical purpose, I should answer that, notwithstanding the happy effects of inoculation, with all the improvements which the practice has received since its first introduction into this country, it not very unfrequently produces deformity of the skin, and sometimes, under the best management, proves fatal.

These circumstances must naturally create in every instance, some degree of painful solicitude for its consequences. But as I have never known fatal effects arise from the cow-pox, even when impressed in the most unfavorable manner, producing extensive inflammations and suppurations on the hands, and as it clearly appears that this disease leaves the constitution in a state of perfect security from the infection of the small-pox, may we not infer that a mode of inoculation may be introduced preferable to that at present adopted, especially among those families, which, from previous circumstances, we may judge to be predisposed to have the disease unfavorably? It is an excess in the number of pustules which we chiefly dread in the small-pox; but, in the cow-pox, no pustules appear, nor does it seem possible for the contagious matter to produce the disease from effluvia, or by other means than contact, and that probably not simply between the virus and the cuticle, so that a single individual in a family might at any time receive it without the risk of infecting the rest, or of spreading a distemper that fills a country with terror. Several instances have come under my observation which justify the assertion that the disease cannot be propagated by effluvia. The first boy whom I inoculated with the matter of cow-pox slept in a bed, while the experiment was going forward, with two children who never had gone either through that disease or the small-pox without infecting either of them.

A young woman who had the cow-pox to a great extent, several sores which maturated having appeared on the hands and wrists, slept in the same bed with a fellow dairy maid who never had been infected with either the cow-pox or the small-pox, but no indisposition followed.

Another instance has occurred of a young woman on whose hands were several large suppurations from the cow-pox, who was at the same time a daily nurse to an infant, but the complaint was not communicated to the child

In some other points of view the inoculation of this disease appears preferable to the variolous inoculation.

In constitutions predisposed to scrofula how frequently we see the inoculated small-pox rouse into activity that distressful malady. This circumstance does not seem to depend on the manner in which the distemper has shown itself, for it has as frequently happened among those who have had it mildly as when it appeared in the contrary way.

There are many who, from some peculiarity in the habit, resist the common effects of variolous matter inserted into the skin, and who are in consequence haunted through life with the distressing idea of being insecure from subsequent infection. A ready mode of dissipating anxiety originating from such a cause must now appear obvious. And, as we have seen that the constitution may at any time be made to feel the febrile attack of cow-pox, might it not, in many chronic diseases, be introduced into the system, with the probability of affording relief upon well known physiological principles?*

Although I say the system may at any time be made to feel the febrile attack of cow-pox, yet I have a single instance before me where the virus acted locally only, but it is not in the least probable that the same person would resist the action both of the cow-pox virus and the variolous.

Elizabeth Sarsenet lived as a dairy maid at Newpark farm, in this parish. All the cows and the servants employed in milking had the cow-pox, but this woman, though she had several sores upon her fingers, felt no tumors in the axilla, nor any general indisposition. On being afterwards casually exposed to variolous infection she had the small-pox in a mild way.†

Hannah Pick, another of the dairy maids, who was a fellow servant with Elizabeth Sarsenet, when the distemper broke out at the farm, was at the same time infected, but this young woman had not only sores upon her hands, but felt herself also much indisposed for a day or two. After this, I made several attempts to give her the small-pox by inoculation, but they all proved fruitless. From the former case, then, we see that the animal economy is subject to the same laws in one disease as the other.

The following case, which has very lately occurred, renders it highly probable that not only the heels of the horse, but other parts of the body of that animal, are capable of generating the virus which produces the cow-pox.

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*Inoculation in a common way upon the arm will seldom produce this effect. When the disease takes place among the dairy people, the virus comes in contact with pre-existing sores, which does not fail to produce an irritation that affects the system generally.

†This will be more satisfactorily explained in the sequel.

An extensive inflammation of the erysipelatous kind appeared without any apparent cause upon the upper part of the thigh of a sucking colt, the property of Mr. Millet, a farmer at Rockhampton, a village near Berkeley. The inflammation continued several weeks, and at length terminated in the formation of three or four small abscesses. The inflamed parts were fomented and dressings were applied by some of the same persons who were employed in milking the cows. The number of cows milked was twenty-four, and the whole of them had the cow-pox. The milkers, consisting of the farmer's wife, a man and a maid servant, were infected by the cows. The man servant had previously gone through the small-pox, and felt but little of the cow-pox. The servant maid had some years before been infected with the cow-pox, and she also felt it now in a slight degree. But the farmer's wife, who never had gone through either of these diseases, felt its effects very severely.

That the disease produced upon the cows by the colt, and from thence conveyed to those who milked them, was the true and not the spurious cow-pox there can be scarcely any room for suspicion; yet it would have been completely satisfactory had the effects of variolous matter been ascertained on the farmer's wife, but there was a peculiarity in her situation which prevented my making the experiment.

Thus far have I proceeded in an enquiry, founded, as it must appear, on the basis of experiment, in which, however, conjecture has been occasionally admitted, in order to present to persons well situated for such discussions, objects for a more minute investigation. In the meantime, I shall myself continue to prosecute this inquiry, encouraged by the pleasing hope of its becoming essentially beneficial to mankind.

FURTHER

OBSERVATIONS

— ON THE —

VARIOLÆ VACCINÆ.

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VARIOLÆ VACCINÆ.

ADVERTISEMENT.

The foregoing pages contain the whole of my first treatise on the "Variolæ Vaccinæ," published in June, 1798. The importance of the inquiry to the whole human race naturally excited universal attention. Ingenuity and industry were set in motion, but as physiological discussions are ever liable to error, from the complicated nature of their character, I soon clearly perceived that this theory, so beneficial to mankind, was liable to fall into disrepute, and to be wholly discredited by the hasty conclusions unfounded on experiment.

To guard the public mind from prejudice, and to enforce the necessity of a scrupulous precaution in the conduct of inoculation with vaccine matter, I was induced to offer to the world "Further Observations" on the disease, which were published in the beginning of the year 1799. These treatises I have here combined, together with some additions which the continuance of the enquiry has enabled me to submit to the public.

FURTHER OBSERVATIONS, &C., &C.

Although it has not been in my power to extend the inquiry into the causes and effects of the Variolæ Vaccinæ much beyond its original limits, yet, perceiving that it is beginning to excite a general spirit of investigation, I think it of importance, without delay, to communicate such facts as have since occurred, and to point out the fallacious sources from whence a disease resembling the true variolæ vaccinæ might arise, with the view of preventing those who may inoculate from producing a spurious disease; and, further, to enforce the precaution suggested in the former treatise on the subject, of subduing the inoculated pustule as soon as it has sufficiently produced its influence on the constitution. From a want of due discrimination of the real existence of the disease, either in the brute or in the human subject, and also of that stage of it in which it is capable of producing the change in the animal economy, which renders it unsusceptible of the cantagion of the small-pox, unpleasant consequences might ensue, the source of which, perhaps, might not be suspected by one inexperienced in conducting such experiments.

My late publication contains a relation of most of the facts which had come under my own inspection at the time it was written, interspersed with some conjectural observations. Since then, Dr. G. Pearson has established an inquiry into the validity of my principal assertion, the result of which cannot but be highly flattering to my feelings. It contains not a single case which I think can be called an exception to the fact I was so firmly impressed with—that the cow-pox protects the human body from the small-pox. I have myself received some further confirmations, which shall be subjoined. I have lately also been favored with a letter from a gentleman of great respectability (Dr. Ingenhousz) informing me that, on making an inquiry into the subject in the county of Wilts, he discovered that a farmer near Calne had been infected with the small-pox after having had the cow-pox, and that the disease in each instance was so strongly characterized as to render the facts incontrovertible. The cow-pox, it seems, from the doctor's information, was communicated to the farmer from his cows, at the time that they gave out an offensive stench from their udders.

Some other instances have likewise been represented to me of the appearance of the disease, apparently marked with its characteristic symptoms, and yet that the patients have afterwards had the small-pox. On these cases I shall, for the present, suspend any particular remarks, but hope that the general observations I have to offer in the sequel will prove of sufficient weight to render the idea of their ever having had existence but as cases of spurious cow-pox extremely doubtful.

Ere I proceed, let me be permitted to observe that truth, in this and every other physiological inquiry that has occupied my attention, has ever been the object of my pursuit; and should it appear in the present instance that I have been led into error, fond as I may appear of the offspring of my labors, I had rather see it perish at once than exist and do a public injury.

I shall proceed to enumerate the sources, or what appear to me as such, of a spurious cow-pox:

Firstly.—That arising from pustules on the nipples or udder of the cow, which pustules contain no specific virus.

Secondly.—From matter, although originally possessing the specific virus, which has suffered a decomposition, either from putrefaction or from any other cause less obvious to the senses.

Thirdly.—From matter taken from an ulcer in an advanced stage, which ulcer arose from a true cow-pock.

Fourthly.—From matter produced on the human skin from contact with some peculiar morbid matter generated by a horse.

On these subjects I shall offer some comments. First—To what length pustulous diseases of the udder and nipples of the cow may extend, it is not in my power to determine; but certain it is that these parts of the animal are subject to some variety of maladies of this nature; and as many of these eruptions, propably all of them, are capable of giving a disease to the human body, would it not be discreet for those engaged in this investigation to suspend controversy and cavil until they can ascertain with precision what is and what is not the genuine cow pox?

For example, a farmer who is not conversant with any of these maladies, but who may have heard of the cow-pox in general terms, may acquaint a neighboring surgeon that the distemper appears at his farm. The surgeon, eager to make an experiment, takes away matter, inoculates, produces a sore, uneasiness in the axilla, and perhaps some affection of the system. This is a way in which a fallacious idea of security, both in the mind of the inoculator and the patient, may arise, for a disease may thus have been propagated from a simple eruption only.

One of the first objects, then, of this pursuit, as I have observed, should be to learn how to distinguish with accuracy between that peculiar pustule which is the true cow-pock, and that which is spurious. Until experience has determined this, we view our object through a mist. Let us, for instance, suppose that the small-pox and the chicken-pox were at the same time to spread among the inhabitants of a country which had never been visited by either of these distempers, and where they were quite unknown before. What confusion would arise! The resemblance between the symptoms of the eruptive fever, and between the pustules, in either case would be so striking that a patient who had gone through the chicken-pox to any extent would feel equally easy with regard to his future security from the small-pox, as the person who had actually passed through that disease. Time and future observation would draw the line of distinction.

So, I presume, it will be with the cow-pox, until it is more generally understood. All cavilling, therefore, on the mere report of those who tell us they have had this distemper, and are afterwards found to be susceptible of the small-pox, should be suspended. To illustrate this, I beg leave to give the following history:

Sarah Merlin, of the parish of Easington, in this county, when about thirteen or fourteen years of age, lived as a servant with farmer Clarke, who kept a dairy, consisting of about eighteen cows, at Stonehouse, a neighboring village. The nipples and udders of three of the cows were extensively affected with large white blisters. These cows the girl milked daily, and, at the same time, she assisted, with two others, in milking the rest of the herd. It soon appeared that the disease was communicated to the girl. The rest of the cows escaped the infection, although they were milked several days after the three above specified had these eruptions on their nipples and udders, and even after the girl's hand became sore. The two others who were engaged in milking, although they milked the cows indiscriminately, received no injury. On the fingers of each of the girl's hands there appeared several large white blisters, she supposes about three or four on each finger. The hands and arms inflamed and swelled, but no constitutional indisposition followed. The sores were anointed with some domestic ointment, and got well without ulcerating.

As this malady was called the cow-pox, and recorded as such in the mind of the patient, she became regardless of the small-pox; but, on being exposed to it some years afterwards, she was infected, and had a full burthen.

Now, had any one conversant with the habits of the disease heard this history, they would have had no hesitation in pronouncing it a case of spurious cow-pox; considering its deviation in the numerous blisters which appeared on the girl's hands; their termination without ulceration; its not proving more generally contagious at the farm, either among the cattle or those employed in milking; and considering also that the patient felt no general indisposition, although there was so great a number of vessicles.

This is perhaps the most deceptious form in which an eruptive disease can be communicated from the cow, and it certainly requires some attention in discriminating it. The most perfect criterion by which the judgment may be guided, is, perhaps, that adopted by those who attend infected cattle. These white blisters on the nipples, they say, never eat into the fleshy parts like those which are commonly of a bluish cast, and which constitute the true cow-pox, but that they affect the skin only, quickly end in scabs, and are not nearly so infectious.

That which appeared to me as one cause of spurious eruptions, I have already remarked in a former treatise, namely, the transition that the cow makes in the spring from a poor to a nutritious diet, and from the udders becoming at this time more vascular than usual for the supply of milk. But there is another source of inflammation and pustules, which I believe is not uncommon in all the dairy counties in the west of England. A cow intended to be exposed for sale, having naturally a small udder, is previously, for a day or two, neither milked artificially nor is her calf suffered to have access to her. Thus the milk is preternaturally accumulated, and the udder and nipples become greatly distended. The consequences frequently are inflammations and eruptions, which maturate.

Whether a disease generated in this way has the power of affecting the constitution in any peculiar manner, I cannot presume positively to determine. It has been conjectured to have been a cause of the true cow-pox, though my inquiries have not led me to adopt this supposition in any one instance. On the contrary, I have known the milkers affected by it, but always found that an affection thus induced left the system as susceptible of the small-pox as before.

What is advanced in my second position, I consider also of very great importance, and I could wish it to be strongly impressed on the minds of all who may be disposed to conclude hastily on my observations, whether engaged in their investigation by experiments or not. To place this in its clearest point of view (as the similarity between the action of the small-pox and the cow-pox matter is so obvious), it will be necessary to consider what we sometimes observe to take place in inoculation for the small-pox when imperfect variolous matter is made use of. The concise history on this subject that was brought forward respecting what I had observed in this neighborhood,[*] I perceive by a reference since made to the Memoirs of the Medical Society of London, may be considered as no more than a corroboration of the facts very clearly detailed by Mr. Kite.[†] To this copious evidence I have to add still more in the following communications from Mr. Earle, surgeon, of Frampton-upon-Severn, in this county, which I deem the more valuable, as he has, with much candor, permitted me to make them public:

"Sir—I have read with satisfaction your late publication on the Variolæ Vaccinæ, and being, among many other curious circumstances, particularly struck with that relating to the inefficacy of small-pox matter in a particular state, I think it proper to lay before you the following facts, which came within my own knowledge, and which certainly tend to strengthen the opinions advanced in pages 51 and 52 of your treatise.

"In March, 1784, a general inoculation took place at Arlingham, in this county. I inoculated several patients with active variolous matter, all of whom had the disease in a favorable way; but my matter being all used, and not being able to procure any more in the state I wished, I was under the necessity of taking it from a pustule which, experience has since proved, was advanced too far to answer the purpose I intended. Of five persons inoculated with this last matter, four took the small-pox afterwards in the natural way; one of whom died, three recovered, and the other, being cautioned by me to avoid as much as possible the chance of catching it, escaped from the disease through life. He died of another disorder about two years ago.

"Although one of these cases ended unfortunate, yet I cannot suppose that any medical man will think me careless or inattentive in their management; for I conceive the appearances were such as might have induced any one to suppose that the persons were perfectly safe from future infection. Inflammation in every case took place in the arm, and fever came on with a considerable degree of pain in the axilla. In some of their arms the inflammation and suppuration were more violent than is commonly observed when perfect matter is made use of; in one there was an ulcer which cast off several large sloughs About the ninth day eruptions appeared, which died away earlier than common without maturation. From these circumstances I should suppose that no medical practitioner would scarcely have entertained a doubt that these patients had been infected with a true small-pox; yet I must confess that some small degree of doubt presented itself to me at the speedy disappearance of the eruptions; and in order, as far as I could, to ascertain their safety, I sent one of them to a much older practitioner than myself. This gentleman, on hearing the circumstance of the case, pronounced the patient perfectly secure from future infection.

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[*] An inquiry into the causes and effects of the Variolæ Vaccinæ.

[†] See an account of some anomalous appearances subsequent to the inoculation of the small-pox, by Charles Kite, surgeon, of Gravesend, in the memoirs of the Medical Society of London. Vol. IV., page 114.

"The following facts are also a striking proof of the truth of your observations on this subject:

"In the year 1789 I inoculated three children of Mr. Coaley, of Hurst-farm, in this county. The arms inflamed properly, fever and pain in the axilla came on precisely the same as in the former cases, and in ten days eruptions appeared, which disappeared in the course of two days I must observe that the matter here made use of was procured for me by a friend, but no doubt it was in an improper state; for, from the similarity of these cases to those which happened at Arlingham five years before, I was somewhat alarmed for their safety, and desired to inoculate them again; which being permitted, I was particularly careful to procure matter in its most perfect state. All the children took the small-pox from this second inoculation, and all had a very full burthen. These facts I conceive strikingly corroborate your opinion relative to the different states of matter; for in both the instances that I have mentioned it was capable of producing something strongly resembling the true small-pox, although it afterwards proved not to be so

"As I think the communication of these cases is a duty I owe to the public, you are at liberty to make what use you please of this letter. I remain, etc.,

JOHN EARLE."

Frampton-upon-Severn, Gloucestershire, November 10, 1798.

"P. S.—I think it necessary to observe, that I can pronounce with the greatest certainty, that the matter with which the Arlingham patients were inoculated was taken from a true small-pox pustule. I took it myself from a subject that had a very full burthen."

Certain then it is that variolous matter may undergo such a change from the putrefactive process, as well as from some of the more obscure and latent processes of nature, as will render it incapable of giving the small-pox in such a manner as to secure the human constitution from future infection, although we see at the same time it is capable of exciting a disease which bears so strong a resemblance to it as to produce inflammation and matter in the incised skin (frequently, indeed, more violent than when it produces its effects perfectly), swelling of the axillary glands, general indisposition and eruptions. So strongly persuaded was the gentleman, whose practice I have mentioned in page 51 of the late Treatise, that he could produce a mild small-pox by his mode of managing the matter, that he spoke of it as a useful discovery, until convinced of his error by the fatal consequence which ensued.

After this ought we to be in the smallest degree surprised to find, among a great number of individuals, who, by living in dairies, have been casually exposed to the cow-pox virus, when in a state analogous to that of the small-pox above described, some who may have had the disease so imperfectly as not to render them secure from variolous attacks? For the matter, when burst from the pustules on the nipples of the cow, by being exposed, from its lodgment there, to the heat of an inflamed surface, and from being, at the same time, in a situation to be occasionally moistened with milk, is often likely to be in a state conducive to putrefaction; and thus, under some modification of decomposition, it must, of course, sometimes find access to the hand of the milker in such a way as to infect him. What confusion should we have were there no other mode of inoculating the small-pox than such as would happen from handling the diseased skin of a person laboring under that distemper in some of its advanced and loathsome stages! It must be observed that every case of small-pox in the human species, whether communicated by design or otherwise, is to be considered as a case of inoculation. And here I may be allowed to make an observation on the case of the farmer, communicated to me by Dr. Ingenhousz. That he was exposed to the matter when it had undergone the putrefactive change, it is highly probable, from the doctor's observing that the sick cows at the farm gave out an offensive stench from the udders. However, I must remark, that it is unusual for cattle to suffer to such an extent, when disordered with the cow-pox, so as to make a by-stander sensible of any ill smell. I have often stood among a herd which had the distemper, without being conscious of its presence from any particular effluvia. Indeed, in this neighborhood it commonly receives an early check from escharotic applications of the cow leech. It has been conceived to be contagious among cows without contact; but this idea cannot be well-founded, because the cattle in one meadow do not affect those in another (although there may be no other partition than a hedge), unless they be handled or milked by those who bring the infectious matter with them; and, of course, the smallest particle imaginable, when applied to a part susceptible of its influence, may produce the effect. Among the human species it appears to be very clear that the disease is produced by contact only. All my attempts, at least, to communicate it by effluvia have hitherto proved ineffectual.

As well as the perfect change from that state in which variolous matter is capable of producing full and decisive effects on the constitution, to that wherein its specific properties are entirely lost, it may reasonably be supposed that it is capable of undergoing a variety of intermediate changes. The following singular occurrences in ten cases of inoculation, obligingly communicated to me by Mr. Trye, senior surgeon to the infimary at Gloucester, seem to indicate that the variolous matter, previously to its being taken from the patient for the intended purpose, was beginning to part with some of its original properties; or, in other words, that it had suffered a partial decomposition. Mr. Trye says: "I inoculated ten children with matter taken at one time and from the same subject. I observed no peculiarity in any of them previously to their inoculation, nor did anything remarkable appear in their arms till after the decline of the disease. Two infants of three months old had erysipelas about the incisions, in one of them extending from the shoulders to the finger's ends. Another infant had abscesses in the cellular substance in the neighborhood of the incisions, and five or six of the rest had axillary abscesses. The matter was taken from the distinct small-pox late in its progress, and when some pustules had been dried. It was received upon glass, and slowly dried by the fire. All the children had pustules which maturated, so that I suppose them all secure from future infection; at least, as secure as any others whom I have ever inoculated. My practice never afforded a sore arm before."

In regard to my former observation on the improper and dangerous mode of preserving variolous matter, I shall here remark that it seems not to have been clearly understood. Finding that it has been confounded with the more eligible modes of preservation, I will explain myself further. When the matter is taken from a fit pustule, and properly prepared for preservation, it may certainly be kept without losing its specific properties a great length of time; for instance, when it is previously dried in the open air on some compact body, as a quill or a piece of glass, and afterwards secured in a small vial.* But when kept several days in a state of moisture, and during that time exposed to a warm temperature, I do not think it can be relied upon as capable of giving a perfect disease, although, as I have before observed, the progress of the symptoms arising from the action of the imperfect matter bear so strong a resemblance to the small-pox when excited completely.

Thirdly—That the first formed virus, or what constitutes the true cow-pock pustule, invariably possesses the power I have ascribed to it, namely, that of affecting the constitution with a specific disease, is a truth that no subsequent occurrence has yet led me to doubt. But as I am now endeavoring to guard the public as much as possible against erroneous conclusions, I shall observe that when this pustule has degenerated into an ulcer (to which state it is sometimes disposed to pass, unless timely checked), I suspect that matter possessing very different properties may sooner or later be produced, and, although it may have passed that stage wherein the specific properties of the matter secreted are no longer present in it, yet, when applied to a sore (as in the casual way), it might dispose that sore to ulcerate, and from its irritation the system would probably become affected; and thus, by assuming some of its strongest characters, it would imitate the genuine cow-pox

From the preceding observations on the matter of small-pox when decomposed, it must, I conceive, be admitted that cow-pox matter in the state now described may produce a disease, the effects of which may be felt both locally and generally, yet that the disease thus induced may not be effectual in obviating the future effects of variolous contagion. In the case of Mary Miller, related by Mr. Kite in the volume above alluded to, it appears that the inflammation and suppuration of the inoculated arm were more than usually severe, although the system underwent no specific change from the action of the virus; which appears from the patient's sickening seven weeks afterwards with the natural small-pox, which went through its course. Some of the cases communicated by Mr. Earle tend further to confirm this fact, as the matter there manifestly produced ulceration on the inoculated part to a considerable extent.

Fourthly.—Whether the cow-pox is a spontaneous disease in the cow, or is to be attributed to matter conveyed to the animal, as I have conceived, from the horse, is a question which, though I shall not attempt now fully to discuss, yet I shall digress so far as to adduce some further observations, and to give my reasons more at large for taking up an opinion that to some has appeared fanciful. The aggregate of these observations, though not amounting to positive proof, forms presumptive evidence of so forcible a kind, that I imagine it might on any other person have made the same impression it did on me, without fixing the imputation of credulity.

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*Thus prepared the cow-pox virus was perfectly active, and possessing all its specific properties, at the end of three months.

Firstly.—I conceived this was its source, from observing that where the cow-pox had appeared among the dairies here (unless it could be traced to the introduction of an infected cow or servant), it had been preceded at the farm by a horse diseased in the manner already described, which horse had been attended by some of the milkers.

Secondly.—From its being a popular opinion throughout this great dairy country, and from its being insisted on by those who here attend sick cattle.

Thirdly.—From the total absence of the disease in those countries where the men servants are not employed in the dairies.*

Fourthly.—From having observed that morbid matter generated by the horse frequently communicates, in a casual way, a disease to the human subject so like the cow-pox that in many cases it would be difficult to make the distinction between one and the other.†

Fifthly.—From being induced to suppose from experiments that some of those who had been thus affected from the horse resisted the small-pox.

Sixthly.—From the progress and general appearance of the pustule on the arm of the boy whom I inoculated with matter taken from the hand of a a man infected by a horse; and from the similarity to the cow-pox of the general constitutional symptoms which followed.‡

I fear it would be trespassing too far to adduce the general testimony of our farmers in support of this opinion; yet I beg leave to introduce an extract from a letter on this subject from the Rev Mr. Moore, of Chalford Hill, in this county:

"In the month of November, 1797, my horse had diseased heels, which was certainly what is termed the grease; and at a short subsequent period my cow was also affected with what a neighboring farmer (who was conversant with the complaints of cattle), pronounced to be the cow-pox, which he, at the same time, observed my servant would be infected with; and this proved to be the case, for he had eruptions on his hands, face and many parts of the body, the pustules appearing large, and not much unlike the small-pox, for which he had been inoculated a year and a half before, and had then a very heavy burthen. The pustules on the face might arise from contact with his hands, as he had a habit of rubbing his forehead, where the sores were the largest and thickest.

"The boy associated with the farmer's sons during the continuance of the disease, neither of whom had had the small-pox, but they felt no ill effects whatever. He was not much indisposed, as the disease did not prevent him from following his occupations as usual. No other person attended the horse or milked the cow but the lad above mentioned. I am firmly of opinion that the disease in the heels of the horse, which was a virulent grease, was the origin of the servant's and the cow's malady."

But to return to the more immediate object of this proposition:

From the similarity of symptoms, both constitutional and local, between the cow-pox and the disease received from morbid matter generated by a horse, the common people in this neighborhood, when infected with this disease, through a strange perversion of terms, frequently called the cow-pox. Let us suppose, then, such a malady to appear among some of the servants at the farm, and at the same time that the cow-pox were to break out among the cattle; and let us suppose, too, that some of the servants were infected in this way, and that others received the infection from the cows. It would be recorded at the farm, and among the servants themselves, wherever they might afterwards be dispersed, that they had all had the cow-pox. But it is clear that an individual thus infected from the horse, would neither be for a certainty secure himself, nor would he impart security to others were they inoculated by virus thus generated. He still would be in danger of taking the small-pox. Yet were this to happen before the nature of the cow-pox be more maturely considered by the public, my evidence on the subject might be depreciated unjustly. For an exemplification of what is here advanced relative to the nature of the infection when received directly from the horse, see "Inquiry into the Causes and Effects of the Variolæ Vaccinæ," pages 25, 26, 27, 28 and page 33; and by way of further example, I beg leave to subjoin the following intelligence received from Mr. Fewster, surgeon, of Thornbury, in this county, a gentleman perfectly well acquainted with the appearances of the cow-pox on the human subject.

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*This information was communicated to me from the first authorities.

†The sound skin does not appear to be susceptible of this virus when inserted into it, but when previously diseased from little accidents its effects are often conspicuous. See plate No. 2.

‡This case (on which I laid no inconsiderable stress in my late treatise, as presumptive evidence of the fact adduced) seems to have been either mistaken or overlooked by those who have commented upon the subject.—See case XVIII, page 33. The boy unfortunately died of a fever at a parish work house before I had an opportunity of observing what effects would have been produced by the matter of small-pox. The experiments published by Mr. Simmons, of Manchester, and others, on the subject, with the view of refuting this theory, appear to have but little weight, as even the cow-pox virus itself, when repeatedly introduced into the sound nipples of cows by means of a lancet, was found to produce no effect.

William Morris, aged thirty-two, servant to Mr. Cox, of Almonsbury, in this county, applied to me on the second of April, 1798. He told me that four days before he found a stiffness and swelling in both hands, which were so painful it was with difficulty he continued his work; that he had been seized with pain in his head, small of the back, and limbs, and with frequent chilly fits succeeded by fever. On examination I found him still affected with these symptoms, and that there was a great prostration of strength. Many parts of his hands on the inside were chapped, and on the middle joint of the thumb of the right hand there was a small phagedenic ulcer, about the size of a large pea, discharging an ichorous fluid. On the middle finger of the same hand there was another ulcer of a similar kind. These sores were of a circular form, and he described their first appearance as being somewhat like blisters arising from a burn. He complained of excessive pain, which extended up his arm into the axilla. These symptoms and appearances of the sores were so exactly like the cow-pox, that I pronounced he had taken the distemper from milking cows. He assured me he had not milked a cow for more than half a year, and that his master's cows had nothing the matter with them. I then asked him if his master had a greasy horse? which he answered in the affirmative, and further said that he had constantly dressed him twice a day for the last three weeks or more, and remarked that the smell of his hands was much like that of the horse's heels. On the fifth of April I again saw him, and found him still complaining of pain in both his hands, nor were his febrile symptoms at all relieved. The ulcers had now spread to the size of a seven shilling gold coin, and another ulcer, which I had not noticed before, appeared on the first joint of the forefinger of the left hand, equally painful with that on the right. I ordered him to bathe his hands in warm bran and water, applied escharotics to the ulcers, and wrapped his hands up in a soft cataplasm. The next day he was much relieved, and in something more than a fortnight got well. He lost his nails from the thumb and fingers that were ulcerated."

The sudden disappearance of the symptoms in this case, after the application of the escharotics to the sores, is worthy of observation. It seems to show that they were kept up by the irritation of the ulcers.

The general symptoms which I have already described of the cow-pox, when communicated in a casual way to any great extent, will, I am convinced, from the many cases I have seen, be found accurate; but from the very slight indisposition which ensues in cases of inoculation, where the pustule, after affecting the constitution, quickly runs into a scab spontaneously, or is artificially suppressed by some proper application, I am induced to believe that the violence of the spmptoms may be ascribed to the inflammation and irritation of the ulcers (when ulceration takes place to any extent, as in the casual small-pox), and that the constitutional symptoms which appear during the presence of the sore, while it assumes the character of a pustule only, are felt but in a very trifling degree. This mild affection of the system happens when the disease makes but a slight local impression on those who have been accidentally infected by cows; and, as far as I have seen, it has uniformly happened among those who have been inoculated, when a pustule only, and no great degree of inflammation or any ulceration, has taken place from the inoculation. The following cases will strengthen this opinion:

The cow-pox appeared at a farm in the village of Stonehouse, in this county, about Michaelmas last, and continued gradually to pass from one cow to another till the end of November. On the twenty-sixth of that month some ichorous matter was taken from a cow, and dried upon a quill. On the second of December some of it was inserted into a scratch, made so superficial that no blood appeared, on the arm of Susan Phipps, a child seven years old. The common inflammatory appearances took place in consequence, and advanced till the fifth day, when they had so much subsided that I did not conceive anything further would ensue.

Sixth.—Appearances stationary.

Seventh.—The inflammation began to advance.

Eighth.—A vesication perceptible on the edges, forming, as in the inoculated small-pox, an appearance not unlike a grain of wheat, with the cleft or indention in the centre.

Ninth.—Pain in the axilla.

Tenth.—A little headache; pulse 110; tongue not discolored; countenance in health.

Eleventh.—No perceptible illness; pulse about 100.

Thirteenth.—The pustule was now surrounded by an efflorescence, interspersed with very minute confluent pustules, to the extent of about an inch. Some of these pustules advanced in size and maturated. So exact was the resemblance of the arm at this stage to the general appearance of the inoculated small-pox, that Mr. D., a neighboring surgeon, who took some matter from it, and who had never seen the cow-pox before, declared he could not perceive any difference.* The child's arm now showed a disposition to scab, and remained stationary for two or three days, when it began to run into an ulcerous state; and then commenced a febrile disposition, accompanied with an increase of axillary tumor. The ulcer continued spreading near a week, during which time the child continued ill, when it increased to a size nearly as large as a shilling. It began now to discharge pus; granulations sprung up, and it healed. This child had before been of a remarkably sickly constitution, but is now in very high health.

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*That the cow-pox was the supposed guardian of the constitution from the action of the small-pox has been a prevalent idea for a long time past, but the similarity in the constitutional effects between one disease and the other could never have been so accurately observed had not the inoculation of the cow-pox placed it in a new and stronger point of view. This practice, too, has shown us what before lay concealed, the rise and progress of the pustule formed by the insertion of the virus, which places in a most conspicuous light its striking resemblance to the pustule from the inoculated small-pox.

Mary Hearn, twelve years of age, was inoculated with matter taken from the arm of Susan Phipps.

Sixth day.—A pustule beginning to appear, slight pain in the axilla.

Seventh.—A distinct vesicle formed.

Eighth.—The vesicle increasing; edges very red; no deviation at this time from the inoculated small-pox.

Ninth.—No indisposition; pustule advancing.

Tenth.—The patient felt this evening a slight febrile attack.

Eleventh.—Free from indisposition.

Twelfth—Thirteenth.—The same.

Fourteenth.—An efflorescence of a faint red color, extending several inches around the arm. The pustule beginning to show a disposition to spread, was dressed with an ointment composed of *hydrarg. nit. rub. & ung ceræ.* The efflorescence itself was covered with a plaster of *ung hydr. fort.* In six hours it was examined, when it was found that the efflorescence had totally disappeared. The application of the ointment with the *hydr. nit. rub.* was made use of for three days, when the state of the pustule remaining stationary, it was exchanged for the *ung. hydr. nit.* This appeared to have a more active effect than the former, and in two or three hours the virus seemed to be subdued, when a simple dressing was made use of; but the sore again showing a disposition to inflame, the *ung. hydr. nit.* was again applied, and soon answered the intended purpose effectually. The girl, after the tenth day, when, as has been observed, she became a little ill, showed not the least symptom of indisposition. She was afterwards exposed to the action of variolous matter, and completely resisted it. Susan Phipps also went through a similar trial.

Conceiving these cases to be important, I have given them in detail; first, to urge the precaution of using such means as may stop the progress of the pustule; and secondly, to point out, what appears to be the fact, that the most material indisposition, or at least that which is felt most sensibly, *does not arise primarily from the first action of the virus on the constitution, but that it often comes on, if the pustule is left to chance, as a secondary disease.* This leads me to conjecture, what experiment must finally determine, that they who have had the small-pox are not afterwards susceptible of the primary action of the cow-pox virus; for, seeing that the simple virus itself, when it has not passed beyond the boundary of a vesicle, excites in the system so little commotion, is it not probable the trifling illness thus induced may be lost in that which so quickly, and often times so severely, follows in the casual cow-pox from the presence of corroding ulcers? This consideration induces me to suppose that I may have been mistaken in my former observation on this subject.

In this respect, as well as many others, a parallel may be drawn between this disease and the small-pox. In the latter, the patient first feels the effect of what is called the absorption of the virus. The symptoms then often nearly retire, when a fresh attack commences, different from the first, and the illness keeps pace with the progress of the pustules through their different stages of maturation, ulceration, etc.

Although the application I have mentioned in the case of Mary Hearn proved sufficient to check the progress of ulceration, and prevent any secondary symptoms, yet, after the pustule has duly exerted its influence, I should prefer the destroying it quickly and effectually to any other mode. The term caustic to a tender ear (and I conceive none will feel more interested in this inquiry than the anxious guardians of a nursery), may sound harsh and unpleasing, but every solicitude that may arise on this account will no longer exist, when it is understood that the pustule in a state fit to be acted upon is then quite superficial, and that it does not occupy the space of a silver penny.*

As a proof of the efficacy of this practice, even before the virus had fully exerted itself on the system, I shall lay before my reader the following history:

By a reference to the treatise on the Variolæ Vaccinæ, it will be seen that in the month of April, 1798, four children were inoculated with the matter of cow-pox; and that in two of these cases the virus on the arm was destroyed soon after it had produced a perceptible sickening.

Mary James, aged seven years, one of the children alluded to, was inoculated in the month of December following with fresh variolous matter, and at the same time was exposed to the effluvia of a patient affected with the small-pox. The appearance and progress of the infected arm was, in every respect, similar to that which we generally observe when variolous matter has been inserted into the skin of a person who has not previously undergone either the cow-pox or the small-pox. On the eighth day, conceiving there was infection in it, she was removed from her residence among those who had not had the small-pox. I was now anxiously waiting the result conceiving from the state of the girl's arm she would fall sick about this time. On visiting her on the evening of the following day (the ninth), all I could learn from the woman who attended her was that she felt somewhat hotter than usual during the night, but was not restless, and that in the morning there was the faint appearance of a rash around her wrists. This went off in a few hours, and was not at all perceptible to me on my visit in the evening. Not a single eruption appeared, the skin having been repeatedly and carefully examined. The inoculated arm continued to make the usual progress to the end, through all the stages of inflammation, maturation and scabbing.

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*I mention escharotics for stopping the progress of the pustule, because I am acquainted with their efficacy. Probably more simple means might answer the purpose quite as well, such as might be found among the mineral and vegetable astringents.

On the eighth day matter was taken from the arm of this girl (Mary James), and inserted into the arms of her mother and brother, (neither of whom had had either the small-pox or the cow-pox), the former about fifty years of age, the latter six.

On the eighth day after the insertion, the boy felt indisposed, and continued unwell two days, when a measles-like rash appeared on his hands and wrists, and was thinly scattered over his arms. The day following his body was marbled over with an appearance somewhat similar, but he did not complain, nor did he appear indisposed. A few pustules now appeared, the greater part of which went away without maturating.

On the ninth day the mother began to complain. She was a little chilly, and had a head-ache for two days, but no pustule appeared on the skin, nor had she any appearance of a rash.

The family was attended by an elderly woman as a nurse, who, in her infancy had been exposed to the contagion of the small-pox, but had resisted it. This woman was now infected, but had the disease in the slightest manner, a very few eruptions appearing, two or three of which only maturated.

From a solitary instance like that adduced of Mary James, whose constitution appears to have resisted the action of the variolous virus, after the influence of the cow-pox virus had been so soon arrested in its progress, no positive conclusion can be fairly drawn; nor from the history of the three other patients, who were subsequently infected; but, nevertheless, the facts collectively may be deemed interesting.

That one mild variety of the small-pox has appeared, I have already plainly shown; and by the means now mentioned we probably may have it in our power to produce at will another.

At the time when the pustule was destroyed in the arm of Mary James, I was informed she had been indisposed about twelve hours; but I am now assured by those who were with her that the space of time was much less. Be that as it may, in cases of cow-pox inoculation I would not recommend any application to subdue the action of the pustule, until convincing proofs had appeared of the patient's having felt its effects at least twelve hours No harm, indeed, could ensue, were a longer period to elapse before the application was made use of. In short, it should be suffered to have as full effect as it could, consistently with the state of the arm.

As the cases of inoculation multiply, I am more and more convinced of the extreme mildness of the symptoms arising merely from the primary action of the virus on the constitution, and that those symptoms which (as in the accidental cow-pox), affect the patient with severity, are entirely secondary, excited by the irritating processes of inflammation and ulceration; and it appears to me that this singular virus possesses an irritating quality of a peculiar kind; but as a single cow-pox pustule is all that is necessary to render the variolous virus ineffectual, and as we possess the means of allaying the irritation, should any arise, it becomes of little or no consequence.

It appears, then, (as far as inference can be drawn from the present progress of cow-pox inoculation), that it is an accidental circumstance only, which can render this a violent disease, and a circumstance of that nature which, fortunately, it is in the power of almost every one to avoid. I allude to the communication of the disease from cows. In this case, should the hands of the milker be affected with little accidental sores to any extent, every sore would become the nidus of infection, and feel the influence of the virus; and the degree of violence in the constitutional symptoms would be in proportion to the number and to the state of these local affections. Hence it follows that a person, either by accident or design, might be so filled with these wounds from contact with the virus, that the constitution might sink under the pressure.

Seeing that we possess the means of rendering the action of the sores mild, which, when left to chance, are capable of producing violent effects; and seeing, too, that these sores bear a resemblance to the small-pox, especially the confluent, should it not encourage the hope that some topical application might be used with advantage to counteract the fatal tendency of that disease, when it appears in this terrific form? At what stage or stages of the disease this may be done with the most promising expectation of success, I will not pretend now to determine. I only throw out this idea as the basis of further reasoning and experiment

I have often been foiled in my efforts to communicate the cow-pox by inoculation. An inflammation will sometimes succeed the scratch or puncture, and in a few days disappear without producing any further effect. Sometimes it will even produce an ichorous fluid, and yet the system will not be affected.* The same thing, we know, happens with the small-pox virus.

Four or five servants were inoculated at a farm contiguous to this place, last summer, with matter just taken from an infected cow. A little inflammation appeared on all their arms, but died away without producing a pustule; yet all these servants caught the disease within a month afterwards from milking the infected cows, and some of them had it severely. At present, no other mode than that commonly practiced for inoculating the small-pox has been used for giving the cow-pox; but it is probable this might be varied with advantage. We should imitate the casual communication more clearly, were we first, by making the smallest superficial incision or puncture on the skin, to produce a little scab, and then, removing it, to touch the abraded part with the virus. A small portion of a thread imbrued in the virus (as in the old method of inoculating the small-pox), and laid upon the slightly incised skin, might probably prove a successful way of giving the disease; or the cutis might be exposed in a minute point by an atom of blistering plaster, and the virus brought in contact with it. In the cases just alluded to, where I did not succeed in giving the disease constitutionally, the experiment was made with matter taken in a purulent state from a pustule on the nipple of a cow.†

Is pure pus, though contained in a small-pox pustule, ever capable of producing the small-pox perfectly? I suspect it is not. Let us consider that it is always preceded by the limpid fluid, which, in constitutions susceptible of variolous contagion, is always infectious; and though, on opening a pustule, its contents may appear perfectly purulent, yet a given quantity of the limpid fluid may at the same time be blended with it, though it would be imperceptible to the only test of our senses, the eye. The presence, then, of this fluid, or its mechanical diffusion through pus, may at all times render active what is apparently mere pus, while its total absence (as in stale pustules) may be attended with the imperfect effects we have seen.

It would be digressing too widely to go far into the doctrine of secretion, but as it will not be quite extraneous, I shall just observe that I consider both the pus and the limpid fluid of the pustule as secretions, but that the organs established by nature to perform the office of secreting these fluids may differ essentially in their mechanical structure. What but a difference in the organization of glandular bodies constitutes the difference in the qualities of the fluids secreted? From some peculiar derangement in the structure, or, in other words, some deviation in the natural action of a gland destined to secrete a mild, innoxious fluid, a poison of the most deadly nature may be created. For example: That gland, which in its sound state, secretes pure saliva, may, from being thrown into diseased action, produce a poison of the most destructive quality. Nature appears to have no more difficulty in forming minute glands among the vascular parts of the body, than she has in forming blood vessels, and millions of these can be called into existence, when inflammation is excited, in a few hours.‡

In the present early stage of the inquiry, (for early it certainly must be deemed), before we know for an absolute certainty how soon the virus of the cow-pox may suffer a change in its specific properties, after it has quitted the limpid state it possessed when forming a pustule, it would be prudent for those who have been inoculated with it to submit to variolous inoculation. No injury or inconvenience can accrue from this, and were the same method practiced among those, who, from inoculation, have felt the small-pox in an unsatisfactory manner at any period of their lives, it might appear that I had not been too officious in offering a cautionary hint, in recommending a second inoculation with matter in its most perfect state.

And here let me suppose, for argument's sake, (not from conviction), that one person in an hundred, after having had the cow-pox should be found susceptible of the small-pox, would this invalidate the utility of the practice? For, waving all other considerations, who will deny that the inoculated small-pox, though abstractedly it may be considered as harmless, does not involve in itself something that in numberless instances proves baneful to the human frame.

That in delicate constitutions it sometimes excites scrofula is a fact that must be generally subscribed to, as it is so obvious to common observation. This consideration is important.

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*At this period of the inquiry I had not discovered the importance of inoculating with virus newly formed in the pustule. The reader will find this explained as he proceeds.

†The cause of these disappointments will be explained.

‡Mr. Home, in his excellent dissertation on pus and mucus, justifies this assertion.

As the effects of the small-pox inoculation on those who have had the cow-pox, will be watched with the most scrupulous eye by those who prosecute this inquiry, it may be proper to bring to their recollection some facts relative to the small-pox, which I must consider here as of consequence, but which hitherto seem not to have made a due impression.

It should be remembered that the constitution cannot by previous infection be rendered totally unsusceptible of the variolous poison; neither the casual nor the inoculated small-pox, whether it produces the disease in a mild or in a violent way, can perfectly extinguish the susceptibility. The skin, we know, is ever ready to exhibit, though often in a very limited degree, the effects of the poison when inserted there: and how frequently do we see among nurses, when much exposed to the contagion, eruptions, and these sometimes preceded by sensible illness! Yet, should anything like an eruption appear, or the smallest degree of indisposition, upon the insertion of the variolous matter on those who have gone through the cow-pox, my assertions respecting the peculiarities of the disease might be unjustly discredited.

I know a gentleman who, many years ago, was inoculated for the small-pox, but having no pustules or scarcely any constitutional affection that was perceptible, he was dissatisfied, and has since been repeatedly inoculated. A vesicle has always been produced in the arm in consequence, with axillary swelling and a slight indisposition. This is by no means a rare occurrence. It is probable that the fluid thus excited upon the skin would always produce the small-pox.

On the arm of a person who had gone through the cow-pox many years before, I once produced a vesication by the infection of variolous matter, and with a little of the fluid inoculated a young woman, who had a mild, but very efficacious, small-pox in consequence, although no constitutional effect was produced on the patient from whom the matter was taken.

The following communication from Mr. Fewster affords a still clearer elucidation of this fact. Mr. Fewster says:

"On the third of April, 1797, I inoculated Master H———, aged fourteen months, for the small-pox. At the usual time he sickened, had a plentiful eruption, particularly on his face, and got well. His nursemaid, aged twenty-four, had many years before gone through the small-pox in the natural way, which was evident from her being much pitted with it. She had used the child to sleep on her left arm, with her left cheek in contact with his face, and during his inoculation had mostly slept in that manner About a week after the child got well she (the nurse) desired me to look at her face, which she said was very painful. There was a plentiful eruption on the left cheek, but not on any other part of the body, which went on to maturation.

"On inquiry, I found that three days before the appearance of the eruption she was taken with slight chilly fits, pain in her head and limbs, and some fever. On the appearance of the eruption these pains went off, and now (the second day of the eruption) she complains of a little sore throat. Whether the above symptoms are the effects of the small-pox or a recent cold, I do not know. On the fifth day of the eruption, I charged a lancet from two of the pustules, and on the next day I inoculated two children—one two years, and the other four months old—with the matter. At the same time I inoculated the mother and eldest sister with variolous matter taken from Master H———. On the fifth day of their inoculation all their arms were inflamed alike; and, on the eighth day, the eldest of those inoculated from the nurse sickened, and the youngest on the eleventh. They had both a plentiful eruption, from which I inoculated several others, who had the disease very favorably. The mother and the other child sickened about the same time, and likewise had a plentiful eruption.

"Soon after a man in the village sickened with the small-pox, and had a confluent kind. To be convinced that the children had had the disease effectually, I took them to his house, and inoculated them in both arms with matter taken from him, but without effect."

These are not brought forward as uncommon occurrences, but as exemplifications of the human system's susceptibility of the variolous contagion, although it has been previously sensible of its action.

Happy it is for mankind that the appearance of the small-pox a second time on the same person beyond a trivial extent, is so extremely rare that it is looked upon as a phenomenon. Indeed, since the publication of Dr. Heberden's paper on the Varicellæ, or chicken-pox, the idea of such an occurrence, in deference to authority so truly respectable, has been generally relinquished This, I conceive, has been without just reason; for, after we have seen, among many others, so strong a case as that recorded by Mr. Edward Withers, surgeon, of Newbury, Berks, in the fourth volume of the memoirs of the Medical Society of London (from which I take the following extracts), no one, I think, will again doubt the fact:

"Mr. Richard Langford, a farmer of West Shefford, in this county (Berks), about fifty years of age, when about a month old, had the small-pox at a time when three others of the family had the same disease, one of whom—a servant man—died of it. Mr. Langford's countenance was strongly indicative of the malignity of the distemper, his face being so remarkably pitted and seamed, as to attract the notice of all who saw him, so that no one could entertain a doubt of his having had that disease in a most inveterate manner."

Mr. Withers proceeds to state that Mr. Langford was seized a second time, had a bad confluent small-pox, and died on the twenty-first day from the seizure; and that four of the family, as also a sister of the patient's, to whom the disease was conveyed by her son's visiting his uncle, falling down with the small-pox, fully satisfied the country with regard to the nature of the disease, which nothing short of this would have done. The sister died.

"This case was thought so extraordinary a one as to induce the rector of the parish to record the particulars in the parish register."

It is singular that in most cases of this kind the disease in the first instance has been confluent; so that the extent of the ulceration on the skin (as in the cow-pox) is not the process in nature which affords security to the constitution.

As the subject of the small-pox is so interwoven with that which is the more immediate object of my present concern, it must plead my excuse for so often introducing it. At present it must be considered a distemper not well understood. The inquiry I have instituted into the nature of the cow-pox will probably promote its more perfect investigation.

The inquiry of Dr. Pearson into the history of the cow-pox having produced so great a number of attestations in favor of my assertion that it proves a protection to the human body from the small-pox, I have not been assiduous in seeking for more; but as some of my friends have been so good as to communicate the following, I shall conclude these observations with their insertion.

Extract of a letter from Mr. Drake, surgeon, at Stroud, in this county, and late surgeon to the North Gloucester Regiment of Militia:

"In the spring of the year 1798 I inoculated men, women and children, to the amount of about seventy. Many of the men did not receive the infection, although inoculated at least three times, and kept in the same room with those who actually underwent the disease during the whole time occupied by them in passing through it. Being anxious they should in future be secure against it, I was very particular in my inquiries to find out whether they ever had previously had it, or at any time been in the neighborhood of people laboring under it. But, after all, the only satisfactory information I could obtain was that they had had the cow-pox. As I was then ignorant of such a disease affecting the human subject, I flattered myself what they imagined to be the cow-pox was in reality the small-pox in a very slight degree. I mentioned the circumstance in the presence of several of the officers, at the same time expressing my doubts if it were not small-pox, and was not a little surprised when I was told by the colonel that he had frequently heard you mention the cow-pox as a disease endemial to Gloucestershire, and that if a person were ever affected by it, you supposed him afterwards secure from the small-pox. This excited my curiosity, and when I visited Gloucestershire I was very inquisitive concerning the subject; and from the information I have since received, both from your publication and from conversation with medical men of the greatest accuracy in their observations, I am fully convinced that what the men supposed to be the cow-pox, was actually so, and I can safely affirm that they effectually resisted the small-pox."

Mr. Fry, surgeon, at Durfley, in this county, favors me with the following communication:

"During the spring of the year 1797, I inoculated fourteen hundred and seventy-five patients, of all ages, from a fortnight old to seventy years, amongst whom there were many who had previously gone through the cow-pox. The exact number I cannot state, but if I say they were near thirty, I am certainly within the number. There was not a single instance of the variolous matter producing any constitutional effect on these people, nor any greater degree of local inflammation than it would have done in the arm of a person who had before gone through the small-pox, notwithstanding it was invariably inserted four, five, and sometimes six different times, to satisfy the minds of the patients. In the common course of inoculation previous to the general one, scarcely a year passed without my meeting with one or two instances of persons who had gone through the cow-pox, resisting the action of the variolous contagion. I may fairly say that the number of people I have seen inoculated with the small-pox, who at former periods had gone through the cow-pox, are not less than forty;* and in no one instance have I known a patient receive the small-pox, notwithstanding they invariably continued to associate with other inoculated patients during the progress of the disease, and many of them purposely exposed themselves to the contagion of the natural small-pox; whence I am fully convinced that a person who had fairly had the cow-pox is no longer capable of being acted upon by the variolous matter.

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*The greater part of these people must, of course, have had the cow-pox many years before this trial was made upon them with the matter of small-pox.—E. J.

"I also inoculated a very considerable number of those who had had a disease which ran through the neighborhood a few years ago, and was called by the common people the swine pox, not one of whom received the small-pox.[*]

"There were about half a dozen instances of people who never had either the cow or swine pox, yet did not receive the small-pox, the system not being in the least deranged, or the arms inflamed, although they were repeatedly inoculated, and associated with others who were laboring under the disease. One of them was the son of a farrier."

Mr. Tierny, assistant surgeon of the South Gloucester Regiment of Militia, has obliged me with the following information:

"That in the summer of the year 1798, he inoculated a great number of the men belonging to the regiment, and that among them he found eleven, who, from having lived in dairies, had gone through the cow-pox. That all of them resisted the small-pox, except one; but that, on making the most rigid and scrupulous inquiry at the farm in Gloucestershire, where the man said he lived when he had the disease, and among those with whom at the same time he declared he had associated, and particularly of a person in the parish, whom he said had dressed his fingers, it most clearly appeared that he aimed at an imposition, and that he never had been affected with the cow-pox.[†]

Mr. Tierney remarks, "that the arms of many who were inoculated, after having had the cow-pox, inflamed very quickly, and that in several a little ichorous fluid was formed."

Mr. Cline, who in July last was so obliging, at my request, as to try the efficacy of the cow-pox virus, was kind enough to give me a letter on the result of it, from which the following is an extract:

"*My Dear Sir*—The cow-pox experiment has succeeded admirably. The child sickened on the seventh day, and the fever, which was moderate, subsided on the eleventh. The inflammation arising from the infection of the virus extended to about four inches in diameter, and then gradually subsided, without having been attended with pain or other inconvenience. There were no eruptions.

"I have since inoculated him with small-pox matter in three places, which were slightly inflamed on the third day, and then subsided.

"Dr. Lister, who was formerly physician to the small-pox hospital, attended the child with me, and he is convinced that it is not possible to give him the small-pox, I think the substituting the cow-pox poison for the small-pox promises to be one of the greatest improvements that has ever been made in medicine; and the more I think on the subject, the more I am impressed with its importance.

"With great esteem, I, am, etc.,
HENRY CLINE."

Lincoln's Inn Fields, August 2, 1798.

From communications, with which I have been favored from Dr. Pearson, who has occasionally reported to me the result of his private practice with the vaccine virus in London, and from Dr. Woodville, who has also favored me with an account of his more extensive inoculation with the same virus at the small-pox hospital, it appears that many of their patients have been affected with eruptions, and that these eruptions have matured in a manner very similar to the variolous. The matter they made use of was taken, in the first instance, from a cow belonging to one of the great milk farms in London. Having never seen maturated pustules produced either in my own practice among those who were casually infected by cows, or those to whom the disease had been communicated by inoculation, I was desirous of seeing the effects of the matter generated in London, on subjects living in the country, A thread imbrued in some of this matter was sent to me, and with it two children were inoculated, whose cases I shall transcribe from my notes.

Stephen Jenner, three years and a-half old.

Third Day—The arm showed a proper and decisive inflammation.

Sixth Day—A vesicle arising.

Seventh Day—The pustule of a cherry color.

Eighth Day—Increasing in elevation. A few spots now appear on each arm, near the insertion of the inferior tendons of the biceps muscles. They are very small and of a vivid red color. The pulse natural; tongue of its natural hue; no loss of appetite, or any symptom of indisposition.

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[*] This was that mild variety of the small-pox which I have noticed in the late treatise on the cow-pox, page 49.

[†] The public cannot be too much on their guard respecting persons of this description.

Ninth Day—Inoculated pustule on the arm this evening began to inflame, and gave the child uneasiness. He cried and pointed to the seat of it, and was immediately afterwards affected with febrile symptoms; at the expiration of two hours after the seizure, a plaster of *ung. hydrarg. fort.* was applied, andits effect was very quickly perceptible, for in ten minutes he assumed his usual looks and playfulness. On examining the arm about three hours after the application of the plaster, its effect in subduing the inflammation were very manifest.

Tenth—The spots on the arms have disappeared, but there are three visible in the face.

Eleventh—Two spots on the face are gone, the other barely perceptible.

Thirteenth—The pustule delineated in the second plate in the treatise on Variolæ Vaccinæ is a correct representation of that on the child's arm as it appears at this time.

Fourteenth—Two fresh spots appear on the face. The pustule on the arm nearly converted into a scab. As long as any fluid remained in it, it was limpid.

James Hill, four years old, was inoculated on the same day, and with part of the same matter which infected Stephen Jenner. It did not appear to have taken effect till the fifth day.

Seventh—A perceptible vesicle. This evening the patient became a little chilly; no pain or tumor discoverable in the axilla.

Eighth—Perfectly well.

Ninth—The same.

Tenth—The vesicle more elevated than I have been accustomed to see it, and assuming more perfectly the variolous character that is common with the cow-pox at this stage.

Eleventh—Surrounded by an inflammatory redness about the size of a shilling, studded over with minute vesicles. The pustule contained a limpid fluid till the fourteenth day, after which it was encrusted over in the usual manner; but this incrustation or scab being accidentally rubbed off it was slow in healing.

These children were afterwards fully exposed to the small-pox contagion without effect.

Having been requested by my friend, Mr. Henry Hicks, of Eastington, in this county, to inoculate two of his children, and at the same time some of his servants and the people employed in his manufactry, matter was taken from the arm of this boy for the purpose. The number inoculated was eighteen. They all took the infection; and, either on the fifth or sixth day, a vesicle was perceptible on the punctured part. Some of them began to feel a little unwell on the eighth day, but the greater number on the ninth. Their illness, as in the former cases described, was of short duration, and not sufficient to interrupt, but at very short intervals, the children from their amusements, or the servants and manufacturers from following their ordinary business.

Three of the children whose employment in the manufactory was in some degree laborious, had an inflammation on their arms beyond the common boundary about the eleventh or twelfth day, when the feverish symptoms, which before were nearly gone off, again returned, accompanied with increase of axillary tumors. In these cases (clearly perceiving the symptoms were governed by the state of the arms), I applied on the inoculated pustules, and renewed the application three or four times within an hour, a pledget of lint, previously soaked in *aqua lythargyri acetati*,* and covered the hot efflorescence surrounding them with cloths dipped in cold water.

The next day I found that this simple mode of treatment had succeeded perfectly. The inflammation was nearly gone off, and with it the symptoms which it had produced.

Some of these patients have since been inoculated with variolous matter without any effect beyond a little inflammation on the part where it was inserted.

Why the arms of those inoculated with the vaccine matter in the country should be more disposed to inflame than those inoculated in London, it may be difficult to determine. From comparing my own cases with some transmitted to me by Dr. Pearson and Dr. Woodville, this appears to be the fact, and what strikes me as still more extraordinary with respect to those inoculated in London is the appearance of maturating eruptions. In the two instances only which I have mentioned (the one from the inoculated, the other from the casual cow-pox) a few red spots appeared, which quickly went off without maturating. The case of the Rev. Mr. Moore's servant may indeed seem like a deviation from the common appearances in the country, but the nature of these eruptions was not ascertained beyond their not possessing the property of communicating the disease by their effluvia. Perhaps the difference we perceive in the state of the arms may be owing to some variety in the mode of action of the virus from the skin of those who breathe the air of London and those who live in the country. That the erysipelas assumes a different form in London from what we see it put on in the country, is a fact very generally acknowledged. In calling the inflammation that is excited by the cow-pox virus erysipelatous, perhaps I may not be critically exact, but it certainly approaches near to it. Now, as the disease going forward in the part infected with the virus may undergo different modifications according to the peculiarities of the constitution on which it is to produce its effect, may it not account for the variation which has been observed?

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*Goulard's extract of Saturn.

To this it may probably be objected that some of the patients inoculated and who had pustules in consequence were newly come from the country, but I conceive that the changes wrought in the human body, through the medium *of* the lungs, may be extremely rapid; yet, after all, further experiments made in London with vaccine virus generated in the country, must finally throw a light on what now certainly appears obscure and mysterious.

The principal variation perceptible to me in the action of the vaccine virus generated in London from that produced in the country was its proving more certainly infectious, and giving a less disposition in the arm to inflame. There appears also a greater elevation of the pustule above the surrounding skin. In my former cases the pustule produced by the insertion of the virus was more like one of those which are so thickly spread over the body in a bad kind of confluent small-pox, except that I saw no instance of pus being formed in it, the matter remaining limpid till the period of scabbing

Wishing to see the effects of the disease on an infant newly born, my nephew, Mr. Henry Jenner, at my request, inserted the vaccine virus into the arm of a child about twenty hours old. His report to me is that the child went through the disease without apparent illness, yet that it was found effectually to resist the action of variolous matter with which it was subsequently inoculated.

I have had an opportunity of trying the effects of the cow-pox matter on a boy who, the day preceding its insertion, sickened with the measles. The eruption of the measles, attened with a cough, a little pain in the chest, and the usual symptoms accompanying that disease, appeared on the third day and spread all over him. The disease went through its course without any deviation from its usual habits; and, notwithstanding this, the cow-pox virus excited its common appearances, both on the arm and on the constitution without any sensible interruption; on the sixth there was a vesicle.

Eighth—Pain in the axilla, chilly and affected with headache.

Ninth—Nearly well.

Twelfth—The pustule spread to the size of a large split pea, but without any surrounding efflorescence. It soon after scabbed and the boy recovered his general health rapidly. But it should be observed that before it scabbed, the efflorescence which had suffered a temporary suspension, advanced in the usual manner. Here we see a deviation from the ordinary habits of the small-pox, as it has been observed that the presence of the measles suspends the action of variolous matter, however the suspension of the efflorescence is worthy of observation.

The very general investigation that is now taking place chiefly through inoculation (and I again repeat my earnest hope that it may be conducted with that calmness and moderation which should ever accompany a philosophical research) must soon place the vaccine disease in its just point of view. The result of all my trials with the virus on the human subject has been uniform. In every instance the patient who has felt its influence has completely lost the susceptibility for the variolous contagion, and as these instances are now become numerous, I conceive that, joined to the observations in the former part of this paper, they sufficiently preclude me from the necessity of entering into controversis with those who have circulated reports adverse to my assertion on no other evidence than what has been casually collected.

A CONTINUATION OF

FACTS AND OBSERVATIONS

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VARIOLÆ VACCINÆ,

OR COW POX.

EDWARD JENNER, M. D. F. R. S. &C

LONDON:
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1801.

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A CONTINUATION OF FACTS AND OBSERVATIONS, &C., &C.

Since my former publications on vaccine inoculation, I have had the satisfaction of seeing it extend very widely. Not only in this country is the subject pursued with ardor, but from my correspondence with many respectable medical gentlemen on the Continent (among whom are Dr. De Carro, of Vienna, and Dr. Ballhorn, of Hanover), I find it is as warmly adopted abroad, where it has afforded the greatest satisfaction. I have the pleasure, too, of seeing that the feeble efforts of a few individuals to depreciate the new practice are sinking fast into contempt beneath the immense mass of evidence which has risen up in support of it.

Upwards of 6000 persons have now been inoculated with the virus of cow-pox, and the far greater part of them have since been inoculated with that of small-pox, and exposed to its infection in every rational way that could be devised without effect.

It was very improbable that the investigation of a disease so analogous to the small-pox should go forward without engaging the attention of the physician of the small-hox hospital in London.

Accordingly, Dr. Woodville, who fills that department with so much respectability, took an early opportunity of instituting an inquiry into the nature of the cow-pox. This inquiry was begun in the early part of the present year, and in May Dr. Woodville published the result, which differs essentially from mine in a point of much importance. It appears that three-fifths of the patients inoculated were affected with eruptions for the most part so perfectly resembling the small-pox as not to be distinguished from them. On this subject it is necessary that I should make some comments.

When I consider that out of the great number of cases of casual inoculation immediately from cows which have from time to time presented themselves to my observation and the many similar instances which have been communicated to me by medical gentlemen in this neighborhood; when I consider that the matter with which inoculations were conducted in the years 1797, 1798, 1799, was taken from different cows, and that in no instance anything like a variolous pustule appeared.

I cannot feel disposed to imagine that eruptions similar to those described by Dr. Woodwille, have ever been produced by the *pure, uncontaminated cow-pox virus*; on the contrary, I do suppose that those which the doctor speaks of originated in the action of variolous matter, which crept into the constitution with the vaccine. And this I presume happened from the inoculation of a great number of the patients with variolous matter, (some on the third, others on the fifth day), after the vaccine had been applied; and it should be observed, that the matter thus propagated became the source of future inoculations in the hands of many medical gentlemen who appeared to have been previously unacquainted with the nature of the cow-pox.

Another circumstance strongly, in my opinion, supporting this supposition is the following: The cow-pox has been known among our dairies time immemorial. If pustules then, like the variolous, were to follow the communication of it from the cow to the milker, would not such a fact have been known, and recorded at our farms? Yet neither our farmers nor the medical people of the neighborhood have noticed such occurence.

A few scattered pimples, I have some times though very rarely, seen, the greater part of which have generally disappeared quickly, but some have remained long enough to suppurate at their apex. The cuticular inflammation, whether springing up spontaneously or arising from the application of acrid substances, such, for instance as *Cantharides, Pix Burgundica, Antimonium Tartavizatum*, etc., will often produce cutaneous affections, not only near the seat of the inflammation, but on some parts of the skin far beyond its boundary, is a well-known fact. It is, doubtless, on this principle that the inoculated cow-pox pustule and its concomitant efflorescence may in very irritable constitutions produce this affection. The eruption I allude to has commonly appeared sometimes in the third week after inoculation, but this appearance is too trivial to excite the least regard.

The change which took place in the general appearance during the progress of the vaccine inoculation at the small-pox hospital should likewise be considered.

Although at first it took on so much of the variolous character, as to produce pustules in three csase out of five, yet in Dr. Woodville's last report, published in June, he says: "Since the publication of my reports of inoculations for the cow-pox, upwards of 300 cases have been under my care, and out of this number only thirty-nine had pustules that suppurated, namely, out of the first hundred, nineteen had pustules; out of the second thirteen; and out of the last hundred and ten, only seven had pustules. Thus it appears that the disease has been considerably milder, which I am inclined to attribute to a greater caution used in the choice of the matter with which the infection was communicated, for lately that which has been employed for this purpose has been taken only from those patients in whom the cow-pox proved very mild and well characterized.*

The inference I am induced to draw from these premises is very different. The decline and finally the total extinction nearly of these pustules in my opinion are more fairly attributable to the cow-pox virus assimilating the variolous,† the former being the original, the latter the same disease under a peculiar and at present an unexplicable modification.

One experiment tending to elucidate the point under discussion,I had myself an opportunity of instituting. On the supposition of its being possible that the cow which ranges over the fertile meadows in the vale of Gloucester, might generate a virus different in some respects in its qualities from that produced by the animal artificially pampered for the production of milk for the metropolis, I procured during my residence there in the spring, some cow-pox virus from a cow at one of the London milk farms.‡ It was immediately conveyed into Gloucestershire to Dr Marshall, who was then extensively engaged in the inoculation of the cow-pox, the general result of which, and of inoculation in particular, with this matter, I shall lay before my readers in the following communication from the doctor:

"*Dear Sir*—My neighbor, Mr. Hicks, having mentioned your wish to be informed of the progress of inoculation here for the cow-pox, and he also having taken the trouble to transmit to you my minutes of the cases which have fallen under my care, I hope you will pardon the trouble I now give you in stating the observations I have made upon the subject. When first informed of it, having two children who had not had the small-pox I determined to inoculate them for the cow-pox whenever I should be so fortunate as to procure matter proper for the purpose. I was, therefore, particularly happy when I was informed that I could procure matter from some of those whom you had inoculated. In the first instance I had no intention of extending the disease further than my own family, but the very extensive influence which the conviction of its efficacy in resisting the small-pox has had upon the minds of the people in general, has rendered that intention nugatory, as you will perceive by the continuation of my cases, inclosed in this letter,‖ by which it will appear that since the twenty-second of March, I have inoculated an hundred and seven persons, which, considering the retired situation I reside in, is a very great number. There are also other considerations which, besides that of its influence in resisting the small-pox, appears to have had their weight, namely, the peculiar mildness of the disease, the known safety of it, and its not having in any instance prevented the patient from following his ordinary business. In all the cases under my care there have only occurred two or three which required any application, owing to erysipelatous inflammation on the arm, and they immediately yielded to it. In the remainder the constitutional illness has been slight, but sufficiently marked and considerably less than I ever observed in the same number inoculated with the small-pox. In only one or two of the cases have any other eruptions appeared than those around the spot where the matter was inserted, and those near the infected part. Neither does there appear in the cow-pox to be the least exciting cause to any other disease, which in the small-pox has been frequently observed, the constitution remaining in as full health and vigor after the termination of the disease as before the infection. Another important consideration appears to be the impossibility of the disease being communicated except by actual contact of the matter of the pustule, and consequently the perfect safety of the remaining part of the family, supposing only one or two should wish to be inoculated at the same time.

Upon the whole it appears evident to me that the cow-pox is a pleasanter, shorter and infinitely more safe disease than the inoculated small-pox, when conducted in the most careful and approved manner, neither is the local affection of the inoculated part or the constitutional illness near so violent. I speak with confidence on the subject, having had an opportunity of observing its effect upon a variety of constitutions, from three months old to sixty years, and to which I have paid particular attention. In the cases alluded to here, you will observe that the removal from the original source of the matter has made no alteration or change in the nature or appearance of the disease, and that it may be continued *ad infinitum* (I imagine) from one person to another (if care be observed in taking the matter at a proper period) without any necessity of recurring to the original matter of the cow.

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*In a few days after the cow-pox inoculation was introduced at the small-pox hospital I was favored with some virus from this stock. In the first instance it produced a few pustules, which did not maturate, but in the subsequent cases none appeared.

†In my first publication on this subject I expressed an opinion that the cow-pox and the small-pox were the same diseases under different modifications. In this opinion Dr. Woodville has concurred. The axiom of the immortal Hunter that "two diseased actions cannot take place at the same time in one and the same part," will not be injured by the admission of this theory.

‡It was taken by Mr. Tanner, then resident student at the Veterinary College, from a cow at Mr. Clark's farm at Kentish town.

‖Dr. Marshall has detailed these cases with great accuracy, but their publication would now be deemed superfluous.—E. J.

I should be happy if any endeavors of mine could tend further to elucidate the subject, and shall be much gratified in sending you any further observations I may be enabled to make. I have the pleasure to subscribe myself, dear sir, etc.,

JOSEPH H. MARSHALL.

Eastington, Gloucestershire, April 26, 1799.

The gentleman who has favored me with the above accounts, has continued to prosecute his inguiries with unrelenting industry, and has communicated the result in another letter, which, at his request, I lay before the public without abbreviation.

DR. MARSHALL'S SECOND LETTER.

"*Dear Sir*—Since the date of my former letter, I have continued to inoculate with the cow-pox virus. Including the cases before enumerated, the number now amounts to four hundred and twenty-three. It would be tedious and useless to detail the progress of the disease in each individual—it is sufficient to observe, that I noticed no deviation in any respect from the cases I formerly adduced. The general appearances of the arm exactly correspond with the account given in your first publication. When they were disposed to become troublesome by erysipalatous inflammation, an application of equal parts of vinegar and water always answered the desired intention. I must not omit to inform you, that when the disease had dnly acted upon the constitution, I have frequently used the vitriolic acid. A portion of a drop applied with the head of a probe or any convenient utensil, upon the pustule, suffered to remain about forty seconds and afterwards washed off wtih sponge and water, never fail to stop its progress and expedite formation of a scab.

"I have already subjected two hundred and eleven of my patients to the action of variolous matter, *but every one resisted it.*

"The result of my experiments (which were made with every requisite caution) has fully convinced me that the true cow-pox is a safe and infalible preventive from the small-pox; that in no case which has fallen under my observation has it been in any considerable degree troublesome, much less have I seen anything like danger; for in no instance were the patients prevented from their ordinary employments.

"In Dr. Woodville's publication on the cow-pox, I notice an ordinary fact. He says that the generality of his patients had pustules. It certainly appears extremely extraordinary that in all my cases there never was but one pustule which appeared on a patient's elbow on the inoculated arm, and maturated. It appeared exactly like that on the incised part.

"The whole of my observations, founded as it appears on extensive experience, leads me to these obvious conclusions; that those cases which have been or may be adduced against the preventive powers of the cow-pox, could not have been those of the true kind, since it must happen to be absolutely impossible that I should have succeeded in such a number of cases without a single exception, if such a preventive power did not exist. I cannot entertain a doubt that the inoculated cow-pox must quickly supercede that of small-pox. If the many important advantages which must result from the new practice are considered, we may reasonably infer that public benefit, that sure test of the real merit of discoveries, will render it generally extensive.

"To you, sir, as the discoverer of this highly-beneficial practice, mankind are under the highest obligations. As a private individual, I participate in the general feeling; more particularly as you have afforded me an opportunity of noticing the effects of a singular disease, and of viewing the progress of the most curious experiment that ever was recorded in the history of physiology.

"I remain, dear sir, etc.,

"JOSEPH H. MARSHALL.

"P. S.—I should have observed that of the patients I inoculated and enumerated in my letter, one hundred and twenty-seven were infected with the matter you sent me from the London cow. I discovered no dissimilarity of symptoms in those cases, from those which I inoculated from matter procured in this county. No pustules have occurred, except in one or two cases, where a single one appeared on the inoculated arm. No difference was apparent in the local inflammation. There was no suspension of ordinary employment among the laboring people, nor was any medicine required.

"I have frequently inoculated one or two in a family, and the remaining part of it some weeks afterwards. The uninfected have slept with the infected during the whole course of the disease without feeling it; so that I am fully convinced the disease cannot be taken but by actual contact with the matter.

"A curious fact has lately fallen under my observation, on which I leave you to comment:

"I visited a patient with the confluent small-pox, and charged a lancet with some of the matter. Two days afterwards I was desired to inoculate a woman and four children with the cow-pox, and I inadvertently took the vaccine matter on the same lancet which was before charged with that of small-pox. In three days I discovered the mistake, and fully expected that my five patients would be infected with small-pox; but I was agreeably surprised to find the disease to be the genuine cow-pox, which proceeded without deviating in any particular from my former cases, I afterwards inoculated these patients with variolous matter, but all of them resisted its action.

"I omitted mentioning another great advantage that now occurs to me in the inoculated cow-pox; I mean the safety with which pregnant women may have the disease communicated to them. I have inoculated a great many females in that situation, and never observed their cases to differ in any respect from those of my own patients. Indeed, the disease is so mild, that it seems as if it might at all times be communicated with the most perfect safety."

I shall here take the opportunity of thanking Dr. Marshall and those other gentlemen who have obligingly presented me with the result of their inoculations; but, as they all agree in the same point as that given in the above communication, namely, the security of the patient from the effects of the small-pox after the cow-pox, their perusal, I presume, would afford us satisfaction that has not been amply given already. Particular occurrences I shall of course detail. Some of my correspondents have mentioned the appearance of small-pox-like eruptions at the commencement of their inoculations; but in these cases the matter was derived from the original stock at the small-pox hospital.

I have myself inoculated a very considerable number from the matter produced by Dr. Marshall's patients, originating in the London cow, without observing pustules of any kind, and have dispersed it among others who have used it with a similar effect. From this source Mr. H. Jenner informs me, he has inoculated an hundred patients without observing eruption. Whether the nature of the virus will undergo any change from being farther removed from its original source, in passing successfully from one person to another time alone can determine. That which I am now employinaghas been in use near eight months, and not the least change is perceptible in its mode of action, either locally or constitutionally. There is, therefore, every reason to expect that its effects will remain unaltered, and that we shall not be under the necessity of seeking fresh supplies from the cow.

The following observations were obligingly sent me by Mr. Tierny assistant surgeon to the South Gloucester Regiment of Militia, to whom I am indebted for a former report on this subject:

"I inoculated with the cow-pox matter, from the eleventh to the latter part of April twenty-five persons including women and children. Some on the eleventh were inoculated with the matter, Mr. Shrapnell (surgeon to the regiment) had from you, the others with matter taken from these. The progress of the punchette was accurately observed, and its appearance seemed to differ from the small-pox in having less inflammation around its basis on the first days, that is, from the third to the seventh, but after this the inflammation increased, extending on the tenth or eleventh day to a circle of an inch and a-half from its centre, and threatening very sore arms; but this, I am happy to say, was not the case, for, by applying mercurial ointment to the inflamed part, which was repeated daily until the inflammation went off, the arm got well without any further application or trouble. The constitutional symptoms which appeared on the eighth or ninth day after inoculation, scarcely deserved the name of disease, as they were so slight as to be barely perceptible, ecept that I could connect a slight headache and langour with a stiffness; and rather painful sensation in the axilla. This latter symptom was the most striking it remained from twelve to forty-eight hours. In no case did I observe the smallest pustule, or even discoloration of the skin like an incipient pustule, except about the part where the virus had been applied.

After all these symptons had subsided and the arms were well, I inoculated four of this number with variolous mattter taken from a patient in another regiment. In each of these it was inserted several times under the cuticle, producing slight inflammation on the second or third day, and always disappearing before the fifth or sixth; except in one who had the cow-pox in Gloucestershire before he joined us, and who also received it at this time by inoculation. In this man the puncture inflamed, and his arm was much sorer than from the infection of the cow-pox virus, but there was no pain in the axilla, nor could any constitutional affection be observed.

"I have only to add that I am now fully satisfied of the efficacy of the cow-pox in preventing the appearance of the small-pox, and that it is a most happy and salutory substitute for it.

"I remain, etc., "M. J. TIERNY,

Although the susceptibility of the virus of the cow-pox is for the most part lost in those who have had the small-pox, yet in some constitutions it is only partially destroyed, and in others it does not appear to be in the least diminished.

By far the greater number on whom trials were made resisted it entirely; yet I found some on whose arms the pustule, from inoculation, was formed completely, but without producing the common efflorescent blush around it, or any constitutional illness, while others have had the disease in the most perfect manner. A case of the latter kind having been presented to me by Mr. Fewster, Surgeon, of Thornbury, I shall insert it:

"Three children were inoculated with the vaccine matter you obligingly sent me. On calling to look at their arms three days after, I was told that John Hodges, one of the three, had been inoculated with tne small-pox when a year old, and that he had a full burthen, of which his face produced plentiful marks, a circumstance I was not before made acquainted with. On the sixth day the arm of this boy appeared as if inoculated with variolous matter, but the pustule was rather more elevated. On the ninth day he complained of violent pain in his head and back, accompanied with vomiting and much fever. The next day he was very well, and went to work as usual. The punctured part began to spread, and there was the areola around the inoculated part to a considerable extent.

"As this is contrary to an assertion made in the Medical and Physicial Journal, No. 8, I thought it right to give you this information, and remain,

"Dear Sir, etc., "J. FEWSTER."

It appears, then, that the animal economy, with regard to the action of this virus, is under the same laws as it is with respect to the variolous virus, after previously feeling its influence, as far as comparisons can be made between two diseases.

Some striking instances of the power of the cow-pox in suspending the progress of the small-pox, after the patients had been several days casually exposed to the infection have been laid before me by Mr. Lyford, Surgeon, of Winchester, and my nephew, the Rev. G. C. Jenner. Mr. Lyford, after giving an account of his extensive and successful practice in the vaccine inoculation in Hampshire, writes as follows:

"The following case occurred to me a short time since, and may probably be worth your notice. I was sent for to a patient with the small-pox, and on inquiry found that, five days previous to my seeing him, the eruption began to appear. During the whole of this time, two children, who had not had the small-pox, were constantly in the room with their father, and frequently on the bed with him. The mother consulted me on the propriety of inoculating them, but objected to my taking the matter from their father, as he was subject to erysipelas. I advised her by all means to have them inoculated at that time, as I could not procure any variolous matter elsewhere. However, they were inoculated with vaccine matter; but I cannot say I flattered myself with its proving successful, as they had previously been so long, and still continued to be, exposed to the variolous infection.

Notwithstanding this, I was agreeably surprised to find the vaccine disease advance and go through its regular course; and, if I may be allowed the expression to the total extinction of the small-pox.

Mr. Jenner's cases were not less satisfactory. He writes as follows:

"A son of Thomas Stinchcomb, of Woodford, near Berkeley, was infected with the natural small-pox at Bristol, and came to his father's cottage. Four days after the eruptions had appeared upon the boy, the family (none of which had ever had the small-pox), consisting of the father, mother, and five children, were inoculated with vaccine virus. On the arm of the mother it failed to produce the least effect, and she of course had the small-pox;[*] but the rest of the family had the cow-pox in the usual mild way, and were not affected with the small-pox, although they were in the same room, and the children slept in the same bed with their brother, who was confined to it with the natural small-pox; and subsequently with their mother.

"I attended this family with my brother, Mr. H. Jenner."

The following cases are of too singular a nature to remain unnoticed.

Miss R———, a young lady about five years old, was seized, on the evening of the eighth day after inoculation with vaccine virus, with such symptoms as commonly denote the accession of violent fever. Her throat was also a little sore, and there were some uneasy sensations about the muscles of the neck. The day following a rash was perceptible on her face and neck, so much resembling the efflorescence of the *Scarlatina Anginosa*, that I was induced to ask whether Miss R——— had been exposed to the contagion of that disease. An answer in the affirmative, and the rapid spreading of the redness over the skin, at once relieved me from much anxiety respecting the nature of the malady, which went through its course in the ordinary way, but not without symptoms which were alarming, both to myself and Mr. Lyford, who attended with me.

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[*] Under similar circumstances, I think it would be advisable to insert the matter into each arm, which would be more likely to insure the success of the matter.—E. J.

There was no apparent deviation in the ordinary progress of the pustule to a state of maturity, from what we see in general; yet there was a total suspension of the *Areola*, or florid discoloration around it, until the *Scarlatina* had retired from the constitution. As soon as the patient was freed from this disease, this appearance advanced in the usual way.*

The case of Miss H——R—— is not less interesting than that of her sister above related. She was exposed to the contagion of the *Scarlatina* at the same time, and sickened almost at the same hour. The symptoms continued severe about twelve hours, when the scarlatina rash showed itself faintly upon her face, and partly upon her neck. After remaining two or three hours it suddenly disappeared, and she became perfectly free from every complaint. My surprise at this sudden transition from extreme sickness to health in great measure ceased, when I observed that the inoculated pustule had occasioned in this case, the common efflorescent appearance around it, and that as it approached the centre, it was nearly in an erysipelatous state. But the remarkable part of this history is, that on the fourth day afterwards, as soon as the efflorescence began to die away upon the arm, and the pustule to dry up, the *Scarlatina* again appeared, her throat became sore, the rash spread all over her. She went fairly through the disease, with its common symptoms.

That these were actually cases of scarlatina was rendered certain by two servants in the family falling ill at the same time with the distemper, who had been exposed to the infection with the young ladies.

Some there are who suppose the security from the small-pox obtained through the cow-pox will be of a temporary nature only. This supposition is refuted, not only by analogy with respect to the habits of diseases of a similar nature, but by incontroventible facts, which appear in great numbers against it. To those already adduced in the former part of my first Treatise, many more might be added were it deemed necessary; but among the cases I refer to, one will be found of a person who had the cow-pox fifty-three years before the offect of the small-pox was tried upon him. As he completely resisted it, the intervening period I conceive must necessarily satisfy any reasonable mind. Should further evidence be thought necessary, I shall observe, that among the cases presented to me by Mr. Fry, Mr. Darke, Mr Tierny, Mr. H. Jenner, and others, there were many whom they inoculated ineffectually with variolous matter, who had gone through the cow-pox many years before this trial was made.

It has been imagined that the cow-pox is capable of being communicated from one person to another by effluvia without the intervention of inoculation. My experiments made with the design of ascertaining this important point, all tend to establish my original position, that it is not infectious, except by contact. I have never hesitated to suffer those, on whose arms there were pustules exhaling the effluvia, from associating or even sleeping with others who never had experienced either the cow-pox or the small-pox, and further, I have repeatedly, among children, caused the uninfected to breathe over the inoculated vaccine pustules during their whole progress; yet these experiments were tried without the least effect. However, to submit a matter so important to a still further scrutiny, I desired Mr. H. Jenner to make any further experiments which might strike him as most likely to establish or refute what had been advanced on this subject. He has since informed me, "that the inoculated children at the breast, whose mothers had not gone through either the small-pox or cow-pox, that he had inoculated mothers whose sucking infants had never undergone either of these diseases; that the effluvia from the inoculated pustules, in either case, had been inhaled from day to day during the whole progress of their maturation, and that there was not the least perceptible effect from these exposures. One woman he inoculated about a week previous to her *accouchement*, that her infant might be the more fully and conveniently exposed to the pustule; but as in the former instances, no infection was given, although the child frequently slept on the arm of its mother, with its nostrils and mouth exposed to the pustule in the fullest state of maturity, In a word, is it not impossible for the cow-pox, whose *only* manifestation appears to consist in the pustules *created by contact*, to produce *itself* by effluvia.

In the course of a late inoculation, I observed an appearance which it may be proper here to relate. The punctured part on a boy's arm (who was inocculated with fresh limpid virus) on the sixth day, instead of showing a beginning vesicle, which is usual in the cow-pox at that period, was encrusted over with a rugged amber-colored scab. The scab continued to spread and increase in thickness for some days, when at its edges a vesicated ring appeared, and the disease went through its ordinary course, the boy having had soreness in the axilla, and some slight indisposition. With the fluid matter taken from his arm, five persons were inoculated. In one it took no effect. In another it produced a perfect pustule without any deviation from the common appearance; but in the other three the progress of the inflammation was exactly similar to the instance which afforded the virus for their inoculation; there was a creeping scab of a loose texture, and subsequently the formation of limpid fluid at its edges. As these people were all employed in laborious exercises, it is possible that these annomalous appearances might owe their origin to the friction of the clothes on the newly inflamed part of the arm. I have not yet had an opportunity of exposing them to small-pox.

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*I witnessed a similar fact in a case of measles. The pustule from the cow-pox virus advanced to maturity, while the measles existed in the constitution, but no efflorescence appeared around it until the measles had ceased to exert its influence.

In the early part of this inquiry I felt far more anxious respecting the inflammation of the inoculated arm than at present, yet that this affection will go on to a greater extent than could be wished, is a circumstance sometimes to be expected. As this can be checked, or even entirely subdued by very simple means, I see no reason why the patient should feel an uneasy hour, because an application may not be absolutely necessary. About the tenth or eleventh day, if the pustule has proceeded regularly, the appearance of the arm will almost to a certainty indicate whether this is to be expected or not. Should it happen, nothing more need be done than to apply a single drop of the *aqua lythargyr acetati*[*] upon the pustule. and having suffered it to remain two or three minutes, to cover the efflorescence surrounding the pustule with a piece of linen dipped in the *aqua lithyargyr compos.*[†] The former may be repeated twice or thrice during the day; the latter as often as it may feel agreeable to the patient.

When the scab is prematurely rubbed off (a circumstance not unfrequent among children and working people), the application of a little *aqua lythargyri acet.* to the part, immediately coagulates the surface which supplies its place, and prevents a sore.

In my former Treatises on this subject, I have remarked that the human constitution frequently retains its susceptibility of the small-pox contagion (both from effluvia and contact) after previously feeling its influence. In further corroboration of this declaration, many facts have been communicated to me by various correspondents. I shall select one of them.

"*Dear Sir*—Society at large must I think feel much indebted to you for your Inquiries and Observations on the Nature and Effects of the Variolæ Vaccinæ, etc., etc. As I conceive what I am now about to communicate to be of some importance, I imagine it cannot be uninteresting to you, especially as it will serve to corroborate your assertion of the susceptibility of the human system of the variolous contagion, although it has previously been made sensible of its action. In November, 1793, I was desired to inoculate a person with the small-pox. I took the variolous matter from a child under the disease in the natural way, who had a large burden of distinct pustules. The mother of the child being desirous of seeing my method of communicating the disease by inoculation, after having opened a pustule, I introduced the point of my lancet in the usual way on the back part of my own hand, and thought no more of it until I felt a sensation in the part, which reminded me of the transaction. This happened upon the third day; on the fourth there were all the appearances common to inoculation, at which I was not at all surprised; nor did I feel myself uneasy, upon perceiving the inflammation continue to increase to the sixth and seventh day, accompanied with a small quantity of fluid, repeated experiments having taught me it might happen so with persons who had undergone the disease, and yet would escape any constitutional affection; but I was not so fortunate; for on the eighth day I was seized with all the symptons of the eruptive fever, but in a much more violent degree than when I was before inoculated, which was about eighteen years previous to this, when I had a considerable number of pustules. I must confess I was now greatly alarmed, although I had been much engaged in the small-pox, having at different times inoculated not less than two thousand persons. I was convinced my present indisposition proceeded from the insertion of the variolous matter, and, therefore, anxiously looked for an eruption. On the tenth day I felt a very unpleasant sensation of stiffness, and heat on each side of my face near my ear, and the fever began to decline. The affection in my face soon terminated in three or four pustules attended with inflammation, but which did not maturate, and I was presently well.

"I remain, dear sir, etc.,

"THOMAS MILES."

This Inquiry is not now so much in its infancy as to restrain me from speaking more positively than formerly on the important point of scrofula, as connected with the small-pox.

Every practitioner in medicine, who has extensively inoculated with the small-pox, or has attended many of those who have had the distemper in the natural way, must acknowledge that he has frequently seen scrofulous affections, in some form or another, sometimes rather quickly showing themselves after the recovery of the patients. Conceiving this fact to be admitted, as I presume it must be by all who have carefully attended to the subject, may I not ask whether it does not appear probable that the gen-

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[*] Extract of Saturn.

[†] Goulard water. For further information on this subject see the first treatise on the Var. Vac., Dr. Marshall's letters, etc.

DR. JENNER'S ACCOUNT

OF THE

ORIGIN OF THE VACCINE INOCULATION.

"The most important discoveries, when familiarized to the mind, are contemplated with indifference. Who now wonders at the discovery of America, or the circulation of the blood? There is, however, a period between the conception of a discovery and its mature birth, fraught with more pangs than war or women know: and there is no light in which the human mind can be viewed more interesting than during this anxious period. Whenever, therefore, the author of any greatly useful invention details the progress of his own mind during the completion of his plan, the history is perused with avidity. On these grounds we conclude that our readers will be much gratified by the following narrative:"

"*I am induced to give the following concise history of the origin of vaccine inoculation, from my frequently observing that those who only consider the subject cursorily, confound the casual cow-pox with the disease when excited by inoculation.* EDWARD JENNER.

"My inquiry into the nature of the cow-pox commenced upwards of twenty-five years ago. My attention to this singular disease was first excited by observing that, among those whom, in the country, I was frequently called upon to inoculate, many resisted every effort to give them small-pox. These patients, I found, had undergone a disease they called the cow-pox, contracted by milking cows affected with a peculiar eruption on their teats. On inquiry, it appeared that it had been known among the dairies time immemorial, and that a vague opinion prevailed of the small-pox. This opinion I found was, comparatively, new among them; for all the older farmers declared they had no such idea in their early days—a circumstance that seemed easily to be accounted for, from my knowing that the common people were very rarely inoculated for the small-pox, till that practice was rendered general by the improved method introduced by the Suttons; so that the working people in the dairies were seldom put to the test of the preventive powers of the cow-pox.

"In the course of the investigation of this subject, which, like all others of a complex and intricate nature, presented many difficulties, I found that some of those *who seemed to have undergone the cow-pox*, nevertheless, on inoculation with the small-pox, felt its influence just the same as if no disease had been communicated to them from the cow. This occurrence led me to inquire among the medical practitioners in the country around me, who all agreed in this sentiment, that the cow-pox was not to be relied upon as a certain preventive of the small-pox. This for a while damped, but did not extinguish my ardor; for, as I proceeded, I had the satisfaction to learn that the cow was subject to some varieties of spontaneous eruptions upon her teats: that they were all capable of communicating sores to the hands of the milkers; and that whatever sore was derived from the animal, was called in the dairy the cow-pox. Thus I surmounted a great obstacle, and, in consequence, was led to form a distinction be-

A CONTINUATION OF

FACTS AND OBSERVATIONS

RELATIVE TO THE

VARIOLÆ VACCINÆ,

OR COW POX.

EDWARD JENNER, M. D. F. R. S. &C

LONDON:
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1801.

If the efflorescence surrounding the pustule should be extensive, and occasion much local heat upon the arm, it may be cooled by the repeated application of pieces of folded linen dipped in cold water, or still more expeditiously by a strong solution of the *aqua lythargyri acetati** in water, an ounce, for example, of the former in five or six of the latter.

If the scab should at any time be prematurely rubbed off, the party may be occasionally touched with undiluted *aqua lythargyri acetati.*

Vaccine virus, taken from a pustule, and inserted immediately in its fluid state, is preferable to that which has been previously dried; but as it is not always practicable to obtain it in this state, we are compelled to seek for some mode of preserving it. Various means have been suggested, but from the test of long experience it may be asserted, that preserving it between two plates of glass is the most eligible. Let a piece of common window glass be cut into squares of about an inch each, so that they shall lie smooth when placed upon each other. Let the collected vaccine fluid be confined to a small spot (about the size of a split pea) upon the centre of one of these glasses; which should be suffered to dry in the common heat of the atmosphere, without exposure to the heat of fire or the sun. When dry, it should be immediately secured by placing over it the other piece of glass. Nothing more is necessary for its preservation than wrapping it in clean writing paper.

The virus thus preserved, when wanted for the purpose of inoculation, may easily be restored to its fluid state by dissolving it in a small portion of cold water, taken upon the point of a lancet. It may be used in the same manner as when just taken from a pustule.

The vaccine fluid is liable, from causes apparently trifling, to undergo a decomposition. In this state it sometimes produces what has been denominated the spurious pustule; that is, a pustule, or an appearance on the arm not possessing the characteristic marks of the genuine pustule. Anomalies, assuming different forms, may be excited, according to the qualities of the virus applied, or the state of the person inoculated; but by far the most frequent variety, or deviation from the perfect pustule, is that which arrives at maturity, and finishes its progress much within the time limited by the true. Its commencement is marked by a troublesome itching; and it throws out a premature efflorescence, sometimes extensive, but seldom circumscribed, or of so vivid a tint as that which surrounds the pustule completely organized; and (which is more characteristic of its degeneracy than the other symptoms) it appears more like a common festering produced by a thorn, or any other small extraneous body sticking in the skin, than a pustule excited by the vaccine virus. It is generally of a straw color, and when punctured, instead of that colorless, transparent fluid of the perfect pustule, its contents are found to be opaque. That deviation from the common character of the pustule, arising from vaccine virus which has been previously exposed to a degree of heat capable of decomposing it, is very different. In this instance it begins with a creeping scab, of a pale brown or amber color, making a long and slow progress, and sometimes going through its course without any perceptible efflorescence. Its edges are commonly elevated, and afford on being punctured, a liquid fluid.

A little practice in vaccine inoculation, attentively conducted, impresses on the mind the perfect character of the vaccine pustule: therefore, when a deviation arises, of whatever kind it may be, common prudence points out the necessity of reinoculation: first with vaccine virus of the most active kind; and, secondly, should this be ineffectual, with variolous virus. But if the constitution shows an insusceptibility of one, it commonly does of the other.

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* Goulard's Extract of Saturn.

When any constitutional symptoms occur in inoculated cow-pox, they are commonly first perceptible (especially in children) on the fourth or fifth day. They appear again, and sometimes in adults, not unlike a mild attack from inoculated small-pox, on the eighth, ninth, or tenth day. The former arise from the general effects of the virus on the habit, the latter from the irritation of the pustule.

If the effluvia of the small-pox have been received into the habit, previously to the inoculation of the vaccine virus, the vaccine inoculation will not always be found to stop its progress, although the pustule may make its advances without interruption.

The lancet used for the inoculation should always be perfectly clean. After each puncture, it is proper to dip it into water, and wipe it dry.

The preservation of vaccine virus upon a lancet beyond the period of a few days, should never be attempted; as it is apt to produce rust, which will decompose it.—*The Medical Repository, Vol. v; New York,* 1802; *page* 483.

EDWARD JENNER.

Shortly after the discovery of Dr. Jenner had attracted public attention, Dr. George Pearson rendered service to the cause of vaccination by establishing an extensive correspondence with medical men in different parts of England, by which he was enabled to prove that cow-pox was much more widely epizöotic than had been at first believed; and that all the local traditions fully confirmed Dr. Jenner's positions.

The early letters of Dr. Pearson indicated not less ardor in behalf of vaccination than respect and admiration for its author.

Dr. Jenner amply repaid the good will of his correspondent by the most unreserved communication of all the knowledge which he possessed.

On the eighth of November, 1798, and just on the eve of the publication of his pamphlet, Dr. George Pearson wrote a letter to Dr. Jenner which, among other matter, contained the following expression: "Your name will live in the memory of mankind as long as men possess gratitude for services and respect for benefactors; and if I can get *matter* I am much mistaken, if I do not make your live for ever."

About the middle of November, 1798, Dr. Pearson published his inquiry concerning the history of the cow-pox, and thus announced its appearance to Dr. Jenner.

DR. PEARSON TO DR. JENNER.

My Dear Sir—Unexpectedly my pamphlet made its public appearance a day or two ago. I am sorry to trouble you to say by what conveyance I can send you a copy, and to what place? If you have any commissions to execute in London, you may as well have a parcel made up, and I will see it forwarded. I observe several errors since printing, partly mine and partly those of the printer; but I know other authors discover similar errors, and that readers do not perceive them.

You can not imagine how fastidious the people are with regard to this business of the cow-pox; one says it is very filthy and nasty to derive it from the sore heel of horses; another, O, my God, we shall introduce the diseases of animals among us, and we have too many already of our own!

A third sapient set say it is a strange, odd kind of business, and they know not what to think of it. All this I hear very quietly, and recollect that a still more unfavorable reception was experienced by the inoculation of the small-pox.

I wish you could secure for me matter for inoculation, because, depend upon it, a thousand inaccurate, but imposing cases, will be published against the specific nature of the disease by persons who want to send their names abroad about any thing, and who will think yourself and me fair game. By way of *Le defendendo* we must inoculate. I have thought it right to publish the evidence as sent to me, and also my own reasoning, because I know you are too good a philosopher to be offended at the investigation of truth, although the conclusions may be different from your own. I think, too, your principal facts will be the better established than if it had happened that I had uniformly acceded to all your doctrine.

I am, with Mrs. P's best compliments to Mrs. Jenner and yourself,

Your obedient servant, G. PEARSON,

Leicester Square, November 13, 1798.

During my visit to Europe, in 1870, I succeeded, after a careful search, in obtaining in London, a single copy of the work of Dr. George Pearson, and also of the work of Dr. Woodville, and we conceive it of importance to the medical profession of America, that they should be reproduced in connection with the works of Dr. Jenner, which are so fully sustained by the facts illustrating the history of the cow-pox.

AN INQUIRY

CONCERNING

THE HISTORY

OF THE

COW-POX,

PRINCIPALLY WITH A VIEW TO

SUPERSEDE AND EXTINGUISH

THE

SMALL-POX,

GEORGE PEARSON, M. D. F. R. S.

PHYSICIAN TO ST. GEORGE'S HOSPITAL; OF THE COLLEGE OF PHYSICIANS.

Feliciores Inserit.—*Hor.*

LONDON:
Printed for J. Johnson, No. 72, St. Paul's Church Yard.
1798.

TO SIR GEORGE BAKER, BART.

Physician to their Majesties, F. R. S. &c., &c.:

Whose medical writing and pre-eminent learning reflect honor on the profession of physic:

This work is inscribed as an acknowledgment for promoting the present inquiry, and as a public testimony of personal regard,

By his ever truly faithful and obedient servant,

GEORGE PEARSON.

Leicester Square, November, 1798.

INQUIRIES CONCERNING THE COW-POX.

sity of the public has been lately gratified by the publication of the long-ex-
ise of Dr. Jenner,[*] on an epizootic disease, commonly known to dairy farmers
e the cow-pox. This distemper of cows has been noticed, time imme-
any provincial situations, where it has been also observed to have been com-
from these diseased animals to the persons who milk them. In the work just
everal facts are related, which seem to let new light into the nature of the
iomy, and to exhibit a near prospect of most important benefits in the prac-
sic. But as some of these facts do not accord, nay, as they are at variance in
rticulars with those to which they are nearest related, the truth of them is
lidated than confirmed by analogy; hence the testimony of a single observer,
cperienced, and worthy to be credited, it is apprehended is insufficient for
uch facts a general acceptance. But granting that the facts should be gen-
tted, without hesitation, to be true in the instances, which have fallen under
of the writer of the above work, the more judicious part of the medical pro
require the observations to be derived from much more extensive and varied
in order to appreciate, justly, the value of the practical conclusions. Hence
irs but little likelihood of improvements in practice being made, unless the
nvestigated by many inquirers, and the attention of the public at large be
d. I do not think that it is necessary for me to explain the various modes,
out the situations in which inquiries may be prosecuted. These I suppose will
ficulty, be understood by perusing Dr. Jenner's treatise. I hope I shall not
ed as assuming too much in recommending, not only those of the profession
out dairy farmers, and others who reside in the country, to collect the facts
ject, which have hitherto fallen under notice, only in a casual way. From
edure, it is reasonable to calculate that the acquisition of established truths
atly accelerated, or error will be exploded.

y to the preceding representation, I go forward to examine the evidence of the
icts, asserted in the publication on the cow-pox; and to state what farther
have derived from my own experience, and from the communications of a
professional gentlemen, of unsuspected veracity, and undoubted accuracy.

t may be right to declare, that I entertain not the most distant expectation of
ng the smallest share of honor, on the score of discovery of facts. The
this account, by the justest title, belongs exclusively to Dr. Jenner; and I
pluck a sprig of laurel from the wreath that decorates his brow.

aration I can prove to demonstration[†] is utterly superfluous for this gentleman
it I am not confident that it is altogether without use, to exempt me from the
which certain members of the profession (with whom I will have no fellow-
d be anxious to excite.

fact in order which I shall examine, may be stated in the following terms:

s who have undergone the specific fever and local disease, occasioned by the cow-pox
mmunicated in the accidental way, (who had not undergone the small-pox,) are
lered unsusceptible of the small-pox.

lish this important fact, Dr. Jenner has related (p. 9 to 26) about twenty in-
inoculation of the small-pox, of persons who were known to have gone through
ox, but not one of them took the small-pox in this way; nor by associating
, with patients laboring under this disease. The permanency of the inexcita-
e constitution to the small-pox, was manifested by some of the instances being
o had been affected with the cow-pox twenty, thirty, forty, and even fifty-three
e. It must not be supposed that the fact is supported by merely these twenty in-
hich were selected for illustration; for Dr. Jenner having resided in Glouces-
venty years, in which county the cow-pox is frequently epizootic, several
stances must have fallen under his own observation, or that of his acquain-
persons not taking the small-pox, who had gone through the cow-pox. Dr.

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iry into the causes and effects of the variolæ vaccinæ, etc., on the cow-pox, by Edward Jenner
. S. etc,, 4to London, 1798.

ing to Dr. Jenner the original paper which I read, as a lecture on the cow-pox; and which
principal materials of this dissertation, he seemed only anxious that I should not think it
ough for publication.

Jenner appears to have been occupied for a long time in ascertaining this fact. And to prove that he has an extraordinary claim to credit on that account, I will mention the following occurrence. When I was in company with the late Mr. John Hunter, about nine years ago, I heard him communicate the information he had received from Dr. Jenner, that in Gloucestershire an infectious disorder frequently prevailed among the milch cows, named the cow-pox, in which there was an eruption on their teats—that those who milked such cows were liable to be affected with pustulous eruptions on their hands, which were also called the cow-pox—that such persons as had undergone this disease, could not be infected by the variolous poison, and that as no patient had been known to die of the cow-pox, the practice of inoculation, of the poison of this disease, to supersede the small-pox might be found, on experience, to be a great improvement in physic.

I noted these observations, and constantly related them, when on the subject of the small-pox, in every course of lectures which I have given since that time.

This fact has been mentioned in two publications: namely, by Mr. Adams,[*] in his book on morbid poison, etc., in 1795; and by Dr. Woodville, in his History of Inoculation, in 1796.[†]

On conversing with Sir George Baker, Bart, concerning the cow-pox, rendering people unsusceptible of the variolous disease, Sir George observed, he had been informed of the fact, in some papers, on the cow-pox, communicated to him many years ago; but that as the statement did not then obtain credit, it was not published. After a fruitless search for these papers, Sir George, whose zeal for the improvement of physic did not forsake him on this occasion, authorized me to write to his relative, the Rev. Herman Drewe, of Abbotts. From this gentleman, who had availed himself of great opportunities of inquiring into the nature of the cow-pox, when he resided in Dorsetshire, I immediately received answers in a very polite letter, to all the queries which I took the liberty of proposing. With regard to the fact under examination, the information received from this gentleman is in these terms: "Mr. Bragge,[‡] who inoculated my parish, rejoiced at having an opportunity of ascertaining the fact. Three women had had the cow-pox, he therefore charged them with a superabundance of matter, but to no purpose; all his other patients, more than fifty, took the infection, but the three women were not in the least disordered, even though they associated constantly with those who were infected. Thirteen similar instances I at that time, in that neighborhood ascertained." Mr. Drewe observes, that the disorder "is epizootic in Devonshire, Dorsetshire, and Somersetshire, and there is no doubt that it is to be met with elsewhere, under the name of cow-pox, or some other denomination. When I made inquiries about the cow-pox I resided in Dorsetshire, and gained all my information from a Mr. Downe, Surgeon, of Bridport, a Mr. Bragge, Surgeon of Axminster, and a Mr. Barnes, of Colyton (since dead.) I have not thought of the matter since, and as my letters on the subject have escaped Sir George Baker's search, so many particulars have my recollection."

Dr. Pulteney[‖] of Blandford, who did me the honor to answer the question which I troubled him with, informs me "that the disease is well known in Hampshire, Dorsetshire, Somersetshire, and Devonshire. That it is not uncommon in Leicestershire, and other midland counties, but dairy-men keep it a secret as much as possible, as it is disreputable to the cleanliness of the produce. An intelligent and respectable inoculator in this country, informed me, that of several hundreds whom he had inoculated for the small-pox, who had previously had the cow pox, very few took the infection; and such as did he had great room to believe were themselves deceived, in regard to their having had the cow-pox."

I am deeply indebted for several letters on the subject, to the Rev. Henry Jerome de Salis, D. D.[§] "I have heard," says he, "a good deal of the cow-pox in this country. I have given a copy of your questions to Mr. Heurtley, and another to Sir William Lee, and I dare say, after a time this country will produce much information relative to the cow-pox. I have found that in this parish, (Wing) this disorder raged in one farm, but did not get beyond it, three years ago. A man who now works with me, was employed with three others in milking the cows. None but himself had had the small-pox, all three had the cow-pox, but he quite escaped it. One of these three is now in the parish, and I will have him inoculated for the small-pox. He was much struck with the resemblance of the symptoms to those he had lately experienced in the small-pox. Mr. Thomas Rhodes, a respectable farmer and dairy-man at Abbots-Aston, (a parish adjoining to this) had the cow-pox when he was a boy, and was afterwards inoculated for the small-pox, without effect. As this is a case quite in point, and as I know the man perfectly well, and also know the inoculator, I will have all the particulars drawn up in the manner you may direct, and authenticated in the course of a few days. I have the name of a servant of his father's who had the cow-pox at the same time that he had it. This man lives in the adjoining parish of Soulbury, and if he has not had the small-pox since, I will have him inoculated after harvest."

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[*] "The cow-pox is a disease well known to the dairy farmers in Gloucestershire. 'What is extraordinary, as far as facts have hitherto been ascertained, the person who has been infected is rendered insensible to the variolous posion." Adams on Morbid Poisons, 8vo. 1795, p. 156.

[†] "It has been conjectured that the small-pox might have been derived from some disease of brute animals: and if it be true that the mange, affecting dogs, can communicate a species of itch to man; or, that a person, having received a certain disorder from handling the seats of cows, is thereby rendered insensible to variolous infection ever afterwards, as some have asserted; then indeed the conjecture is not improbable. Woodville, p. 7.

[‡] Mr. Drewe's Letter, Abbotts, July 5, 1798.

[‖] Dr. Pulteney's Letter, Blandford, July 14, 1798.

[§] Dr. de Salis' Letters, Wing, Bucks, July 20th, 25th and 29th, 1798.

In the dairy farm above mentioned, in which the cow-pox raged three years ago, it had not appeared for the preceding fourteen or fifteen years. Two men were then infected, one of whom lives now at Aylesbury, and the other at Bushy. For reasons which I will hereafter give you, I shall inquire after the man at Aylesbury."

From Mr. Downe,* Surgeon of Bridport, I have received some important information.

"The cow-pox is a disorder in Devonshire as well as Dorsetshire, but it so rarely occurs, that the sources of information are very scanty. A few years ago, when I inoculated a great number for the small-pox, I remarked that I could not, by any means, infect one or two of them, and on inquiry, I was informed they had previously been infected with the cow-pox. Some few families who had been infected with the cow-pox, were repeatedly inoculated with the matter of the small-pox, and without effect. I know that a medical man in this part of the country was injured in his practice, by a prejudice raised unjustly, that he intended to substitute the cow-pox for the small-pox. So great an enemy to improvement are the prejudices of the public in the country, that I think experiments of importance can only be made in hospitals.

"A farmer's† wife in this neighbourhood, her daughter, and two sons, were all employed in milking the cows when this disorder prevailed among them. The mother had gone through the small-pox in the natural way, but the others had never had the small-pox. The latter, viz: the two sons and daughter, were infected from the cows, and the mother continued to milk them the whole time, without the least inconvenience. The daughter and two sons had a slight fever, and afterwards eruptions on the hands, by which they were much relieved of their fever. I had this account from one of the parties infected, and it may be depended upon.

About three years since I inoculated between six and seven hundred, and I recollect one or two of the number who could not be infected. On inquiry I found they had previously had the cow-pox."

The Rev. John Smith, of Wendover, to whom I owe many thanks for very willingly, at my request, taking upon himself the trouble of making inquiries in his neighborhood, informs me‡ that the high land of his parish does not admit of dairying upon it, and the dairy farmers here know nothing of the cow-pox. But Mr. Henderson, the Surgeon in the parish, whose practice takes him a little into the vale, tells me, that he has met with the disease, and that a few years ago he three times endeavoured to inoculate a lad, who had been used to milking, but could only excite inflammation upon the arm, without any pustulous appearance. And upon inquiry, he found the lad had previously been affected with the cow-pox. Mr. Woodman, a Surgeon at Aylesbury, had met with the disease among the cow boys in the vale. Mr. Grey, a Surgeon of Buckingham, says the disorder is common among the milkers in his neighborhood. He had not been led to consider, particularly, the effects of the disease, but he remembers one boy possessed of the idea, that he could not take the small-pox by inoculation, because he had had the cow-pox, and that he could only excite redness upon the boy's arm. He thinks he recollects cases of boys having had the small-pox, after having had the cow-pox. The disease is not very notorious, for I passed some days last week with two intelligent farmers, one of them had kept seventy milk cows for many years past, but knew nothing of the cow-pox among his servants. The other knew as little."

Mr. Giffard,‖ Surgeon of Gillingham, near Shaftsbury, has been so good as to write to me on the subject of the cow-pox; he informs me. "That it is a disease more known in Dorsetshire than in most other counties." "I last winter," says he, "inoculated three parishes, and some of the subjects told me they had had the cow-pox, and that they should not take the small-pox but I desired to inoculate them. I did so two or three times, but without effect. Persons never take the small-pox after they have had the cow-pox."

On Thursday, June 14th last, happening, with Mr. Lucas, Apothecary, to be on professional business at Mr. Wilan's farm, adjoining to the New Road, Maybone; which farm is appropriated entirely for the support of from 800 to 1000 milk cows; I availed myself of that opportunity to make inquiry concerning the cow-pox. I was told it was a pretty frequent disease among the cows of that farm, especially in winter. That it was supposed to arise from sudden change from poor to rich food. It was also well known to the servants, some of whom had been affected with that malady, from milking the diseased cows. On inquiry, I found three of the men servants, namely, Thomas Edinburgh, Thomas Grimshaw and John Clarke, had been affected with the cow-pox, but not with small-pox. I induced them to be inoculated for the small-pox: and, with the view of ascertaining the efficacy of the variolous infection employed, William Kent and Thomas East, neither of whom had either the cow-pox or the small-pox, were also inoculated.

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* Mr. Downe's Letter, Bridport, August 1, 1798.

† Mr. Downe's Second Letter, Bridport, August 25, 1798.

‡ Mr. Smith's Letter, Vicarage, Wendover, August 5, 1798.

‖ Mr. Giffard's Letter, Gillingham, August 9, 1798.

Three of these men, viz: Edinburgh, East and Kent, were inoculated in each arm with perhaps a larger incision, and more matter, than usual, on Sunday, June 17th, by Mr. Lucas; and Dr. Woodville and myself were present. The matter was taken from a boy present, who had been inoculated fourteen days before this time, and who was obligingly provided by Dr. Woodville.

CASE I.

Thomas Edinburgh, aged twenty-six years, had lived at the farm the last seven years. Had never had the small-pox, nor chicken pox, nor, any eruption resembling that of these diseases, but the cow-pox, which he was certainly affected with six years ago. He was so lame from the eruption on the palm of the hands as to leave his employ, in order to be for some time in a public hospital; and he testified that his fellow-servant, Grimshaw, was at the same time ill with the same disorder. A cicatrix was seen on the palm of the hands, but none on the other part. He said that for three days in the disease, he suffered from pain in the axillæ, which were swollen and sore to the touch. According to the patient's description, the disease was uncommonly painful and of long continuance; whether on account of the unusual thickness of the skin, which was perceived by the lancet in inoculation, future observation may determine.

THIRD DAY.—TUESDAY, JUNE 19.

A slight elevation appeared on the parts inoculated. No disorder was perceived of the constitution, nor complaint made.

FIFTH DAY—THURSDAY, 21.

The appearance on the part inoculated, of the left arm, was like that of a gnat bite, and Mr. Wackfel, apothecary to the Small-Pox Hospital, observed that the inflammation seemed too rapid for that of the variolous infection, when it produces the small-pox. On the other arm there had been a little scab, which was rubbed off, leaving only a just visible red mark. No complaint was made.

EIGHTH DAY—SUNDAY, 24.

The inflammation on the left arm had subsided, and there was in place of it, a little scab. The right arm as before. Has remained quite well.

Sent the patient with Mr. Wackfel to the Small-Pox Hospital, where he was inoculated a second time, with matter from a person present, who then labored under the small-pox.

FOURTH DAY AFTER SECOND INOCULATION, WEDNESDAY, 27.

A little inflammation appeared on the part inoculated of one arm, but none of that of the other. Except some slight pains and headache on Monday last, had remained quite well.

EIGHTH DAY AFTER SECOND INOCULATION, SUNDAY, JULY 1.

A little dry scab was upon each part inoculated. No symptoms of disorder had appeared.

CASE II.

Thomas Grimshaw, aged about thirty years. Had lived in town, at the farm only seven weeks, but six years ago also lived at this place, when he was affected with the cow-pox; and he testified that his fellow-servant, Edinburgh, was at the same time ill of the same disease Grimshaw said he had pains and soreness on touching the axillæ during the illness. but he got much sooner well than Edinburgh.

On Tuesday, the nineteenth June, Grimshaw was inoculated in both arms, at the Small-Pox Hospital, from a patient then ill of the small-pox.

THIRD DAY—THURSDAY, 21.

A little inflammation and fluid appeared under a lens in the parts inoculated, as if the infection had taken effect. Remained quite well.

SIXTH DAY—SUNDAY, 24.

Inflammation which had spread near the parts inoculated has disappeared; and now nothing was seen but a dry scab on them. Had not been at all disordered. He was inoculated this day a second time, as before, at the Small-Pox Hospital.

FOURH DAY—SECOND INOCULATION, WEDNESDAY, JUNE 27.

Not the least inflammation from the last inoculation, nor any complaint.

EIGHTH DAY—SECOND INOCULATION, SUNDAY, JULY 1.

Not the smallest inflammation from the inoculation. Had remained quite well.

CASE III.

John Clarke, twenty-six years of age, had the cow-pox ten years ago at Abingdon, where he was under the care of a medical practitioner of that place. He was inoculated by Mr. Wackfel, at the Small-Pox Hospital, on Tuesday, June 29th, from a patient affected with the small-pox.

THIRD DAY—THURSDAY, JUNE 21.

There was inflammation, and a fluid in the parts inoculated; but these appearances were judged to be premature, with respect to the small-pox.

SIXTH DAY—SUNDAY, JUNE 24.

The appearances of inflammation and fluid in the right arm, were such as to make it doubtful whether or not the variolous infection had taken effect; but there was no such appearance on the left arm, the inflammation being gone.

He was this day inoculated a second time at the Small-Pox Hospital, from a patient.

EIGHTH DAY AFTER SECOND INOCULATION, SUNDAY, JULY 1.

No effect but inflammation, and afterwards festering, from the second inoculation.

The inflammation on the right arm, from the first inoculation, went off in a day or two after the last report. He had remained quite well in all respects.

CASE IV.

William Kent, thirty years of age, had lived at Mr. Willan's farm about eight weeks. Had never labored under the small-pox, but said he had gone through the chicken-pox; and he had been told that he had been affected with a disorder, which was supposed to be the cow-pox, when he was four years of age. He was inoculated under the same circumstances as Thomas Edinburgh, by Mr. Lucas, on Sunday, June 17.

THIRD DAY—TUESDAY, 19.

The parts inoculated were scarcely red, yet their appearance was such, when viewed under a lens, as to render it probable the small-pox would take place. Remained quite well.

FIFTH DAY—THURSDAY, 21.

The inoculated part of the left arm appeared red; and on viewing it with the magnifier. a little bladder was seen in the middle. The same was the state of the right arm, but less evidently. Continued free from illness. Pulse 94 after walking two miles in a very hot day.

EIGHTH DAY—SUNDAY, 24.

The left arm was more inflamed, and a small flat vesication appeared in the middle of the inflamed part. The right arm was affected in the same manner, but in a less degree. It was not doubted that he was infected with the variolous disease, especially as he complained of soreness of the arm pits, and he has been very much disordered the two last nights, having had pain of his bones in general, and headache, and had felt very hot, but not chilly. Pulse was only eighty, and his tongue had the healthy appearance, nor was he thirsty.

ELEVENTH DAY—WEDNESDAY, 27.

Variolous eruptions in number, perhaps twenty or thirty had made their appearance.

FIFTEENTH DAY—SUNDAY, JULY 1.

Eruptions are in a suppurated state. Had been quite well, and he has continued his employ during the present hot week.

CASE V.

Thomas East, aged twenty-one years, he believed he had never been affected with the small-pox, and certainly not with the cow-pox. There were several cicatrices, however, on his arms, exactly like those from the small-pox, and if the inoculation had not succeeded, I should have been disposed to conclude that he had already gone through that disease.

He was inoculated by Mr. Lucas on Sunday, seventeenth June, at the same time, and under the same circumstances, as Thomas Edinburgh and William Kent.

THIRD DAY—TUESDAY, JUNE 19.

Only a just visible scab on the parts inoculated, and it was thought the infection had not taken effect. Remained well.

Went to the Small-Pox Hospital, and was inoculated a second time.

FIFTH DAY—THURSDAY, JUNE 21.

Redness appears now in the parts inoculated, as if both the first and second inoculation had taken effect.

EIGHTH DAY—SUNDAY. JUNE 24.

All the four parts inoculated were so much inflamed, that it seemed now doubtful, whether the small-pox would come on. Parts first inoculated, less inflamed than those of the second inoculation; and the right arm more inflamed than the left. Pains of the axillæ were complained of, which were a little swelled, and sore to the touch. There were no symptoms of fever.

ELEVENTH DAY—WEDNESDAY, JUNE 27.

About a dozen variolous eruptions were now out. No complaints were made.

FIFTEENTH DAY—SUNDAY, JULY 1.

Variolous eruptions were in a state of suppuration. There was a suppuration of the parts inoculated pretty much alike, from both the first and second inoculation.

It was thought the second inoculation had excited inflammation in the parts first inoculated, which otherwise might not have taken place so soon, or not at all.

Notwithstanding the hot weather for the last fortnight, the temperature being generally 68° to 78° of Fahrenheit's thermometer, the patients who took the small-pox were so little disordered, that they continued their daily work.

No treatment was prescribed previously to inoculation, all the men being in health; but every other day after it, for a fortnight, they were purged with salts, and directed to abstain from strong liquors, and to eat very little animal food.

I did not require any further evidence than what I have already procured, in my own practice, to satisfy me, that the quantity of variolous matter does not influence the disease; but on account of some late assertions, that the disorder is rendered milder by using a smaller quantity of matter in the above cases, a larger quantity was purposely inserted; yet milder cases than the above could not be desired.

It should also be noticed that the three patients above mentioned, who did not take the infection on inoculation for the small-pox, had their children soon afterwards inoculated, who all took the small-pox. These men lived in the same apartments with their children during the illness of the small-pox; but not one of them was infected.

We have seen in the above cases, five persons inoculated for the small-pox, under the most favorable circumstances for the efficaciousness of the infection; two of them took the disease from once inserting variolous matter, but the other three were uninfected, although the matter was twice inserted; and although they were exposed to infection, by living with their children while they were suffering under the small-pox.

The three patients who did not take the small-pox, gave strong circumstantial evidence that they had been affected with the cow-pox, but not with the small-pox. The other two patients, who were infected with the small-pox, there is no reason to doubt were as credible persons as the former, and they attested that they had not had the small-pox; which attestation being verified by their taking the disease, it would be injustice to question the other part of their evidence, that they had not labored under the cow-pox. For, as to the mere traditionary story of William Kent having the cow-pox, no circumstance supported the truth of it against the extreme improbability of a boy of four years of age, or under, suffering a disease which is contracted by handling the teats of cows in milking, when they are so difficult to manage, that male, instead of female servants, must then, generally, be employed. In some places, it seems the eruptive disease, which is known to medical men by the name of the chicken, or swine-pox, is called by the lower orders of people, cow-pox, Mr. Giffard takes notice that "there are two kinds of cow-pox," the one is attended with eruptions of the skin in general, and sometimes produces pits; but the other is a disease confined to the hands. It is most probable that Kent's eruptive disease, when a child, was the chicken-pox, if he really had an eruptive disease. One of three reasons may be assigned for the above three patients not taking the small-pox: viz. 1. That they had already suffered the small-pox. 2. That they had not had this disease, and that their constitutions were not excitable at the time they were inoculated; for one can scarce suspect the failure to be from the mode of inserting the matter. 3. That they were not capable of infection with the small-pox poison, because they had undergone the cow-pox. In respect of the first assignable reason, it must be allowed that a person may go through the small-pox, and the disease be so slight, that it is neither noticed by the patient, nor by his friends. But such unobserved cases are extremely rare, and they bear so very small a proportion to the others, that for three such cases to occur together on the present occasion, seems to be barely a possibility.

With regard to the second assigned reason, probably about one out of fifty persons does not take the small-pox by inoculation of the same matter, and in the same manner; and perhaps not more than one out of fifty of those who are not infected by a first inoculation, fail to be infected on a second inoculation. According to this representation, then it appears to be a mere possibility that the small-pox poison should not take effect, for the second assignable reason, namely, a peculiar disposition; especially as the patients were subsequently under very favorable circumstances, for being infected with variolous effluvia.

With regard to the third assignable reason, as in so many instances now recorded, it appears that persons, who have undergone the cow-pox, are not susceptible of the small-pox; and as the failure of the inoculation cannot be imputed with justice to the two other causes above mentioned, it seems most reasonable to impute the inefficacy of the variolous poison in the above three instances to a state of inexcitability, produced by the cow-pox poison

On making inquiries at Mr. Kendal's farm, for milch cows, on the New Road, Marybone, a female servant informed me that she labored under the cow-pox many years ago, when she lived in Suffolk, where this disease prevails. From her description I could not doubt that she had really been affected with the cow-pox. After this she took, what she believed to be the small-pox, from an infant, which was nourished by her breasts. A fever preceded the eruptions, which were only about fifty in number, and they disappeared in a few days after they came out. If the latter part of this testimony is accurate, one cannot admit this case to be an example of the small-pox, taking place in a constitution which had previously been affected wtih the cow-pox.

At this farm, a cow was shown to me which was said to be affected with the cow-pox: on examination, the disorder appeared to be in its last stage of desiccation. However, eight persons, who had not undergone the small pox, were inoculated with the scabs of this disorder, but no disease ensued.

On calling at Mr. Rhodes' milk farm on the Hampstead Road, where there is a very large stock of cows, I found the cow-pox had not fallen under his observation; but two of the male servants were well acquainted with some parts of its history. It appeared also on inquiry, that one of the cows had really labored under the disease two months before, namely, in May last, but the milker was not infected, because he said there were no cuts on his hands, or abrasion of the cuticle. It was described very clearly to be a different disease from the common inflammations and eruptions which produce scabbed nipples. One of the male servants had often seen the disease in Wiltshire and Gloucestershire. The milkers, he said, were sometimes so ill, as to lie in bed for several days, and there was a fever at the beginning, as in the small-pox, but that no one ever died of it. He had known many persons who had laboured under the cow-pox, but who had never suffered the small-pox, although it prevailed in their own families; except in one instance in which he was told that the person who took the small-pox, had gone through the cow-pox when a child. The same servant said it was a common opinion, that people who have been affected with the cow-pox, to use his own words, are "hard to take the small-pox."

Mr. Francis, who keeps a farm for milch cows on the road to Somers' Town, had seen the disease several times in the autumn among his cattle, and he knew that it was very apt to produce painful sores on the milkers; but he had never heard, or observed, that it prevented persons from having the small-pox.

He said that three years ago, in the spring, the disease prevailed at several farms on the New Road.

A male servant of Mr Francis, who has a good understanding, and is a man of veracity, and had lived in dairy farms all his life, stated, "that he had seen the cow-pox thirty-five years ago at King's Wood, in Somersetshire, and frequently there. and in London since that time. The disease, he said was then vulgarly called ths cow-pox; it appeared on the teats and udders with fiery or flame like eruptions—was very infectious among the cows and the milkers; but never knew either human creature, or beast die of it. It affects the hands and arms of the milkers with painful sores, as large as a sixpence, which last for a month or more, so as to disable the sufferers from continuing their employment. The disease breaks out especially in the spring, but occasionally at other times of the year. Most of the cows in his master's, Mr, Francis; farm, were infected three years ago in the spring at which times many of the milkers were also infected. A new cow is very liable to take the disease. He had always understood that a person who had had the cow-pox, could not take the small-pox, and never knew in the course of his life an instance of the small-pox in such persons.

The following instances fell under his own observation: a fellow male and a female servant were affected with the cow-pox; some time after this, the parish in which they lived were in general inoculated for the small-pox, but these two persons, who had never labored under the small-pox, could not be infected with this disease; nor did they take it, although they subsequently lived with their children while they were suffering the small-pox. He also believed, and it was a common opinion in many parts of the country, that persons who have undergone the small-pox cannot take the cow pox. He himself labored under the inoculated small-pox when seventeen years of age, but never took the cow-pox, although he had milked a great number of cows laboring under the disease. He had never known either a human creature, or cow have the disease more than once. He had the measles previously to the small-pox, as well as the hooping cough.

At some other farms, near London, where milch cows are kept, I found the disorder was not known either to the masters, or servants.

Dr. Haygarth very kindly wrote me a letter from Bath, on the 30th of August last, in which he says, "To none of your questions, concerning the cow-pox, can I give any answer from my own knowledge. Of such a distemper, I never heard among the Cheshire, or Welsh farmers. My first intelligence upon this subject came from my friend, Dr. Worthington, of Ross, some time ago. He, as well as another friend, Dr. Percival, speak very favorably of Dr. Jenner, on whose testimony the extraordinary facts he has published at present principally depend."

I feel most sensibly the great favor shown to me by Professor Wall, of Oxford. Although this gentleman's zeal and ability in promoting useful inquiries are acknowledged, I cannot but attribute the great pains which he bestowed to procure answers to my queries in so short a time as I required, in part, to the friendship founded in the days of academical studies; to use this amiable gentleman's own words—"those days of free, manly, and liberal conversation which I reflect on with infinite pleasure.

The information belonging to this place, from Professor Wall,[*] is the answer to the question, whether there is sufficient evidence that the small-pox cannot infect a person who has once had the cow-pox, attended with fever; and if there has been a local affection without fever, is such person still capable of taking the small-pox!

"I receive but one answer to the two different modes of the question, which is, that any person who has ever had the cow-pox, has never been known to have the small-pox."

A servant who has kept the cows of a considerable dairy-farm in this neighborhood a great many years, told me that he had the cow-pox early in life. Yet about six or seven years ago he wished, for security, to be inoculated for the small-pox—the operation was performed three several times, but no disorder nor eruption ensued—the Surgeon, a gentleman of great eminence in this place, asked him if he had ever had the cow-pox; upon his answering yes, the Surgeon replied. Then it is useless to make any farther trial. This servant, the next year, had several children inoculated by Sutton. He was with them all the time till their recovery, but did not receive the infection. A servant-girl at another considerable farm. told me she had the cow-pox early in life; several years after she was inoculated, but nothing took place, except the appearance of red blush round the incision similar, I suppose, to what Dr. Jenner mentions.

This red suffusion has been hastily, by some inoculators, regarded as a proof, that the system has been infected with the virus of the small-pox; but neither this appearance, nor even a much more considerable affection of the arm is always sufficient security against future infection, unless, there has been some eruption.—See Memoirs of the Medical Society."

From Mr. Dolling, an Inoculator at Blandford, I have received important intelligence, for which I am under further obligations to the Rev. Herman Drewe.[†] "Mr. Dolling has inoculated for the small pox a great number of persons, who said they had been affected with the cow-pox, and very few of them took the infection, to produce the small-pox, and he is of opinion that those who took the small-pox, were mistaken in supposing they had really labored under the cow-pox. In one family five out of seven children took the cow-pox, by handling the teats of a cow affected with the cow.pox; these seven children were inoculated for the small-pox, but none took the infection, except the two who had not labored under the cow-pox.

Dr. Croft tells me, that in Staffordshire, to his knowledge, the fact has been long known, of the cow pox, which prevails in that county, affording an exemption of the human subject from the small-pox. This gentleman affords me an unequivocal proof of his conviction of the safety and efficacy of the inoculated cow-pox, by his application to me for matter, in order to inoculate one of his own children.

My honorable friend, Mr. Edward Howard, has been assured on very good authority, that of a relation, who is an officer in the Oxfordshire Militia, that it is a received opinion among the soldiers, that it is unnecessary to be inoculated for the small-pox, if they have already labored under the cow-pox, as many of them have done.

Dr. Redfearn of Lynn[‡] informs me, that "the cow-pox is a common disease among the cattle in this part, and the farmers have made use of the appellation cow-pox for near thirty years, although totally ignorant of the disease existing in the West of England." But,

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[*] See Dr. Wall's Letter, Oxford, September 3, 1798.

[†] The Rev. H. Drewe's Second Letter, Septemder 17, 1798.

[‡] Dr. Redfearn's Letter, September 15 1798.

Dr. Alderson, of Norwich[*] acquaints me, that there is reason to believe the disease is not known in his neighborhood.

My correspondents in the North and East Ridings of Yorkshire, in Durham, in Lincolnshire, and in the neighborhood of Windsor, acquaint me that the cow-pox is not known in those parts. But from the success which I have had in discovering the disease, by making a strict inquiry in farms, where it was believed not to exist, I can scarce doubt that it breaks out occasionally in every part, where a number of cows are kept, and that the infection is widely disseminated

I do not find that the cow-pox is known in Lancashire. Dr. Currie,[†] of Liverpool, obligingly answers my letter; he says, "I have made inquiries among the farmers, but I have not been able to find one who is acquainted with the disease. Of course I cannot answer any of your queries. My friend, Dr. Percival, of Manchester, who is now here, never heard of the cow-pox in this county, any more than myself."

II. Person who have been affected with the specific fever, and peculiar local disease, by inoculation of the cow-pox infection, who had not previously, undergone the small-pox, are thereby rendered unsusceptible of the small-pox.

The first set of evidences of this fact are those of Dr. Jenner, in the cases xvii, xix, xx, xxi, xxii, xxiii. They are instances of inoculation of the cow pox as in the small-pox, with matter taken from the teats of cows. A fever like that of the small-pox arose in six to nine days after the incision, but scarce of more than twenty-four hours, duration; attended with an inflammatory appearance, or erythematous efflorescence around the parts inoculated, and postulous sores of those parts; which do not suppurate, but remain limpid till they disappear; and there is no eruption of other parts of the skin, as in the small-pox.

In the cases of inoculation under Dr. Jenner, the local affection was commonly as slight as in the inoculated small-pox, but sometimes there appeared a disposition to a more extensive inflammation of the skin around the parts in which the matter was inserted. "It seemed to arise from the state of the pustule, which spread out accompanied with some degree of pain, to about half the diameter of a sixpence. By the application of mercurial ointment to the inflamed parts, (as is practised in the inoculated small pox) the complaint soon subsided. To prevent inflammation of the skin, caustic was also applied to the vesicle of the inoculated part, to excite a different kind of inflammation; but the precaution was perhaps unnecessary, as a third patient had nothing applied, and the arm scabbed quickly, without any erysipelas.

One of these patients inoculated with the cow-pox was only six months old, and who took the disease. In none of the above cases, after the cow-pox; could the small-pox be excited, by repeated inoculation. The confidence of Dr Jenner, in the safety and efficacy of the inoculation of the cow-pox is unequivocally declared by the inoculation of his own son, R. F. Jenner, aged elevenmonths; although the poison did not take effect in this instance. The project of inoculation of the cow-pox occurred to other practioners, antecedently to Dr Jenner's experiments.

Mr. Drewe, in his letter above cited, speaks of the practice. He says, "Mr. Bragge and I endeavored to try the experiment of inoculating with the matter of the cow-pox, but from the scarceness of the disease, and unwillingness of patients, we were disappointed."

Mr. Pulteney informs me, that "a very respectable practioner acquainted him that of seven children whom he had inoculated for the small-pox, five had been previously infected with the cow-pox purposely, by being made to handle the teats and udders of infected cows; in consequence of which, they suffered the distemper. These five, after inoculation for the small pox, did not sicken; the other two took the distemper."

Farther, "A farmer in this country inoculated his wife and children with matter taken from the teat of a cow. At the end of a week the arms inflamed, and the patients were so far affected, as to alarm the farmer, although unnecessarily, and incline him to call in medical assistance. They all soon got well, and were afterwards inoculated for the small-pox, but no disease followed. I was not applied to in this case, but the fact is sufficiently ascertained."

Mr. Downe furnishes me[‡] with important information on the present fact. "R. F. near Bridport, when about twenty years of age, was at a farm house when the dairy was infected with the cow-pox. It being suggested to him that it would be the means of preserving him from the small-pox, which he had never taken, if he would submit to be inoculated with the cow-pox; he gave his consent; he was infected in two or three places in his hand with a needle. He felt no inconvenience till about a week, when the parts began to inflame, and his hand to swell, his head to ach, and many other symptoms of fever came on. He was recommended to keep much in the open air, which he did, and in four or five days the symptoms of fever went off, as the maturation of the hand advanced. The parts soon healed, leaving permanent scars. He was afterwards inoculated twice by my grand-father, and a considerable time after twice by my father, but without any other effect than a slight irritation of the part, such as is occasioned in the arms of persons who have already had the small-pox. It was not expected at the time, that the small-pox poison would be effectual, but it was inserted, partly by way of experiment, and partly by way of precaution, the small-pox being then in the family. The small-pox has been repeated since in his own family, and he never avoided it, being confident that it was not possible to infect him with this disease. The next case by Mr. Downe, although it affords defective evidence, is not useless. "I have lately conversed with a person who was in play, inoculated in the hand with the cow-pox matter. The wounds apparently healed for a time, and then inflamed. He had a swelling in the axilla, pain in the head, sickness, and slight fever. No eruption took place, but there was much maturation at the place of insertion, and considerable scars remain."

Next hear what Professer Wall says in his answer to the question, "Whether the disease has been communicated by inoculation, and whether it has produced a milder or more severe disease than in the casual way?"

"I have[‖] not yet learnt that this disorder has, in this part of the country, ever been propagated by inoculation designedly. It has been communicated to persons who have had slight wounds from thorns, abrasions of the skin from other causes, perhaps more readily than in the common way; but it has not appeared that the character or severity of the disorder has been altered by this circumstance."

Mr. Dolling,[§] of Blandford, communicates the following: "Mr. Justings of Axminster inoculated his wife and children with matter taken from the teats of a cow that had the cow-pox; in about a week after inoculation, their arms were very much inflamed, and the patients were so ill, that the medical assistance of Mr. Meach, of Cerne, was called for. The patients did well. They were afterwards inoculated for the small-pox by Mr. Trobridge, without effect.

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[*] Dr Alderson's Letter, Norwich, September 16, 1798.

[†] Dr. Currie's Letter, Liverpool, September 8, 1796.

[‡] See Mr. Downe's Letter of August 25, 1798.

[‖] Professor Wall's Letter, above cited.

[§] Mr. Drewe's Second Letter, above cited.

III. The disease produced by inoculating with the matter of the cow-pox, does not differ from the disease produced by inoculation with the matter from the human animal; nor is any difference observed in the effects of the matter from the first human subject infected from the brute animal, or from the matter generated successively, in the second, third, fourth, or fifth human creature from its origin in the brute.

This important fact, at present, is only supported by the instance related by Dr. Jenner, in the cases xix to xxiii, p. 37 to 14. Hence, according to these instances, the poison of the cow-pox has the same properties, as appears from its effects on the human constitution, whether it be generated by the cow, or by the human animal; and these properties are the same, however remote from the origin of the poison in the cow. But it has not been determined by inoculating the teats of cows with the matter taken from the cow, and with that taken from the human creature; that the properties of the poison from this latter source are the same with regard to the brute, as those of the matter from the cow with regard to the same animal.

I apprehend that the cow-pox is the only example at present known, of a permanent specific infectious disease in the human constitution, produced by matter from a different species of animal; but it has been often conjectured, that many of the infectious diseases of the human species are derived from brutes.

IV. A person having been affected with the specific fever, and local disease, produced by the cow-pox poison, is liable to be again affected as before by the same poison; and yet such person is not susceptible of the small-pox.

I find that most part of professional men are extremely reluctant in yielding their assent to this fact. Some, indeed, reject it in the most unqualified terms. They are not averse from admitting the evidence, that the cow-pox may affect the same constitution repeatedly; or even that a person having had this disease, is unsusceptible of the small-pox; but that the constitution having suffered the cow-pox, should still be susceptible of this disease, and not be susceptible of the small-pox, is an assertion with regard to which they demur to acquiesce. The unfavorable reception of the evidence for this fact does not seem to arise so much from the observations in support of it, being suspected to be inaccurate, or sufficiently full and complete, as from its appearing, as they say, absurd and inconceivable. On inquiring why the fact appears in this light, we find it is because there is no support from any other analogous fact. There is, in reality, no analogous fact. We have facts which show that a person having undergone certain diseases, occasioned by particular poisons, in some instances is, and in others is not, again susceptible of the same disease, by the same poison; but the instance before us is the first which has been observed of the constitution being, rendered inexcitable to a disease, from a given morbid poison, by having suffered a different disease from another different poison, and yet it remains suspectible of this different disease by this given morbid poison. In the first instance of certain new facts, it is easy to conceive that there may be no analogous fact to the one discovered. When the small-pox first broke out, on its being discovered that the same constitution could not undergo this disease a second time, no analogous fact was, I think, then known; and on that account it probably was not admitted without much hesitation. But on a subsequent discovery that the same constitution could not be infected more than once with the measles, this, as well as the former fact, readily found acceptance. An evidence for a fact ought not to be rejected, because it is incomprehensible or inconsistent with what is already known; but on the present occasion, if the subject be well considered, it does not seem to be difficult to conceive that a change may be effected in the human constitution, by a disease from a morbid poison, so as to render such constitution unsusceptible of a disease from a given different morbid poison, and yet such constitution shall remain susceptible of the former disease, from the former morbid poison. Hence, I apprehend, the only just ground of objection which may be taken, is that of the observations on the authority of which the fact is said to be established, Let us then state the evidence,

Under Case ix. p. 21, Dr. Jenner relates the history of a person who was first affected with the cow-pox in the year 1780, a second time in 1791, and a third time in 1794. "The disease was equally severe the second and third time as it was the first," which is, in general, other wise both in the brute and human kind. Inoculation of the variolous poison was twice instituted in this patient, but without producing disease, nor could the patient be infected by association with persons laboring under the small-pox.

Another patient (see Jenner, p 51.) suffered the cow-pox in 1759; in 1797 he was inoculated with the variolous poison, but without exciting the disease, In 1798 the cow-pox again took place

With respect to the information which I have gained by my inquiries, concerning this fact; some of my correspondents observed, that the cow-pox occurred so seldom among the human kind, that they had no observations to determine, whether a person could undergo the disease more than once; the greater part of my correspondents ventured to say, that it had never been seen more then once in the same person; but some testified that the cow-pox certainly does take place, repeatedly, in the same constitution.

Mr. Woodman, of Aylesbury,* says, "the cow-pox does not supersede itself on future occasions, for that cow-boys have it repeatedly."

It may be worth while to notice, that none of the gentlemen of whom I made inquiries, knew an instance of the disease attacking the same cow more than once; and it was said that it was the current opinion that this was a fact.

The evidence for this fact, to my apprehension, only proves, satisfactorily, that the local affection of the cow-pox may occur in the same person more than once; but whether the peculiar fever also occurs more than once in the same person, from the cow-pox poison, does not appear certain; and must be determined by future observations, to be made with a particular view to this point. Future observations must likewise determine, whether, in those cases, (if such occur) in which a person, after having gone through the cow-pox, takes the small-pox the cow-pox was attended with the fever, or was merely a local affection. It seems pretty well ascertained, that the variolous poison may produce the small-pox only locally, or without any affection of the constitution; and in such a case, the constitution is still susceptible of the small-pox, and yet in both cases, viz: of the local affection only, and of the whole constitution, the matter of the eruptions is capable of infecting others, so as to produce the small-pox; either locally only, or also in the whole constitution. Hence it seems probable, that similar local and general effects may be produced by the cow-pox poison, and not only in the human kind, but in cows. I acknowledge, however, that the case, p 51. in Jenner's book, militates against this supposition.

V. A person is susceptible of the cow-pox, who has antecedently been affected with the small-pox.

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*See Mr. Smith's Letter, above cited.

Dr. Jenner, pp. 15-19, gives some instances of persons taking the cow-pox who had certainly gone through the small-pox. But he says, "It is a fact so well known among our dairy farmers, that those who have had the small-pox either escape the cow-pox or are disposed to have it slightly: that as soon as the complaint shows itself among the cattle, assistants are procured, if possible, who are thus rendered less susceptible of it, otherwise the business of the farm could scarcely go forward."

I have not got much additional information on this fact. It seems, however, sufficiently authenticated that people may have the cow-pox after they have had the small-pox, but it will require more nice attention to satisfy the query whether, in such cases, the cow-pox affects the whole constitution or is only a local affection?

Mr. Downe[*], in particular, speaks of a family who did not take the cow-pox when much exposed to the infliction, because they had all gone through the small-pox, except one who had been afflicted already with the cow-pox. I met with a servant at Mr. Rhodes' farm, on the Hampstead Road, who attested that he had suffered the cow-pox fourteen years ago, but that long before that time he had gone through the small-pox. Professor Wall[†] says: "The answer to the question whether a person is capable of taking the cow-pox who has gone through the small-pox, is of some decidedly that such a person is not liable to the infection of the cow-pox. Others of equal experience have answered this question with doubt."

At Mr. Rhodes' farm, at Islington, I found that one of the male servants who had been long employed in taking care of milk cows in the environs of London, distinguished the cow-pox very clearly from common inflammation of the teats with scabs, with which several cows were at the time that I saw this man affected. He had never contracted the cow-pox, although he had been repeatedly exposed to the infection, and when others took it. He was deeply pitted with the small-pox, which he labored under when a young child.

VI. The cow-pox is not communicated in the state of effluvia or gas, nor by adhering to the skin in an imperceptably small quantity, nor scarce, unless it be applied to divisions of the skin by abrasions, punctures, wounds, etc.

Some morbific poisons are communicated to animals only in the state of invisible effluvia or gas, e. g. the miasmata which produced intermittent fevers; the contagion which produces the ulcerous sore throat, that which occasions the whooping-cough, the measles, etc. Other morbific poisons are communicated both in the state of effluvia and in a palpable or visible quantity, e. g. the variolous poison, the matter which produces in oxen, the murrain or loose bovilla, etc. Others again are not propagated in the state of effluvia or gas, but in a palpable or visible quantity only, as the hydrophobic poison, the syphilitic, etc., and to these last must now be added the morbific poison of the cow-pox.

It does not appear that the disease spreads from any infected cow among other cows which are fed in the same stable like a contagious disease. Persons who sleep in the same bed with one who is laboring with the cow-pox are not in this way liable to be infected. (See Jenner, pp. 68, 69.) It is not even propagated from the cows to the milkers for the most part, unless the skin of the part of the hands to which the matter is applied be divided.

This property of the cow-pox infection not being propagated so as to produce disease, but by contact, and then only when applied in a palpable or visible quantity, and also scarce unless the skin be divided, is the most important one. Yet a few instances I apprehend will suffice to show clearly under what circumstances the cow-pox infliction produces disease.

A boy who was inoculated for the cow-pox slept, while he was laboring under the disease, with two other boys, but neither of them by this exposure to the affliction got the cow-pox. A young woman who had the cow-pox, with several sores, which maturated to a great extent, slept in the same bed with a fellow dairy maid who never had been inflicted either with the cow-pox or small-pox, but the disease was not communicated. A young woman, on whose hands were several large suppurations from the cow-pox, was a daily nurse to an infant, but the infant was uninfected. (See Jenner, pp. 68-69.)

I am instructed uniformly by my correspondents that the cow-pox arises only from matter evidently applied most frequently by friction of the diseased teats in milking, but sometimes from the matter lodging accidentally in some soft part, yet even under the circumstance it frequently fails to infect unless there be a cut, scratch, puncture, etc., of the hands.

Mr. Drewe mentions the instance of a woman who lost her eyesight in consequence of the infectious matter being heedlessly applied to the eye, and that the cow-pox has been observed to take place from handling the milk pail on which the infectious matter has been incautiously allowed to remain.

VII. The local affection in the cow-pox produced in the casual way is generally more severe and of longer duration than usually happens in the local afflictions in the inoculated small-pox, but in the cow-pox the fever is in no case attended with symptoms which denote danger, nor has it in any instance been known to prove mortal.

The cow-pox in the incidental way, for sufficiently obvious reasons, most commonly affects the palms of the hands. There is a wide difference in the degree of a local affection. I am instructed by my communications that the extreme cases are, firstly, those in which the patients are inflicted with so much painful inflammation as to be confined to their beds for several days, and have painful phagedenic sores for several months. Secondly, those cases which are so slight that the patients are not confined at all, but get well in a week or ten days. In the more severe cases, in which the inflamed spots become vesicular with edges of the pustules more elevated than the cuticle, and of a *bluish* or a *purple color*: there are pains of the axilla, fever and now and then a little delirium.

These symptoms continue from one to three or four days, leaving ulcerated sores about the hands, which, from the sensibility of the parts, are very troublesome, and commonly heal slowly, frequently becoming phagedenic, like those from which they sprung. The lips, nostrils, eyelids and other parts of the body are sometimes affected with sores, but these evidently arise from their being heedlessly rubbed or scratched with the patient's inflicted fingers. Dr. Jenner considers the *bluish* or *livid* tint of the pustules to be characteristic of the cow-pox. P. 5.

Mr Drewe's information on the fact is, "That the symptoms are similar to the small-pox, but less violent. The pustules are only about the hands, in the parts which have been in contact with the infected teats."

Mr. Downe's letter of August 30.

[†] Letter of Professor Wall, above cited.

But in answer to the question whether on the whole the cow-pox is a disease of less magnitude than the small-pox by inoculation, he says: "When I consider what a slight disorder the inoculated small-pox is, it will not, in my humble opinion, admit of comparison,"

Mr. Dolling says: "There is a swelling under the arm, chilly fits, etc., not different from symptoms of the breeding of the small-pox. After the usual time of sickening, namely, two or three days, there is a large ulcer, not unlike a carbuncle, which discharges matter."

Dr. Pulteney's account of the symptoms is in these terms: "A soreness and swelling of the axillary glands as under inoculation for the small-pox, then chilliness and rigors and fevers as in the small-pox. Two or three days afterwards; abscesses, not unlike carbuncles, appear generally, on the hands and arms, which ulcerate and discharge much matter."

Mr. Downe, speaking to this point, says: "The symptoms, as far as could be ascertained in the cow-pox, were similar to those of the small-pox, but I never heard of any who had them in any degree alarming." Again, "the symptoms are exactly similar to those of the small-pox by inoculation, when of the most favorable kind. The disease generally disappears in about the same time that the small-pox does."

Mr. Giffard tells me that "he never heard of either men or cows dying of the cow-pox."

Mr. Woodman (see Mr. Smith's letter) testifies that he never observed symptoms worthy to be called fever; there was merely "feverish heat when the pain was considerable."

Dr. DeSalis observes that one of the persons affected with the cow-pox "was much struck with the resemblance to the symptoms he had lately experienced in the small-pox."

Professor Wall's information is that "the milkers have the disorder only once, generally with preceding fever, sometimes very violent, sometimes more mild." "No human creature, or cow, has been known to be in danger, or to die of the cow-pox." After a strict inquiry at the milk farms adjoining to London, I could not find that any person had died of the cow-pox.

With respect to the animals from which the human creature derives the disease, it is known only to effect cows. They have, sometimes, but it is very seldom observed, a disorder of the whole constitution, "the secretion of milk being much lessened." The local affection appears with irregular pustules on the nipples. "At their first appearance they are commonly of a *palish blue*, or, rather, of a color somewhat approaching *livid*, and are surrounded by an erysipelas inflammation These pustules, unless a timely remedy be applied, frequently degenerate into phagedenic ulcers, which prove extremely troublesome. (See Jenner, pp. 3 and 4.)

Dr. Pulteney acquaints us, that "the disease makes its appearance on the udder of the cow, and affects the teats principally, which inflame, then ulcerate, discharging a bloody matter: *but it does not appear that the disease is more local, as the cows seem not to be out of health in other respects.*"

From Dr. Drewe's testimony, however, it appears that the whole constitution of the cow is affected. There being "loss of appetite and of milk," as well as "ulcerated teats," so as to render the animal, in some cases, totally unfit for the dairy. "It is infectious in the herd, and the infection is probably conveyed by the person's hands that milks them."

Mr. Downe's information, relating to the present part of our inquiry, is that "the only symptoms were eruptions about the teats of the cow, exactly similar to the small-pox, which gradually become sore, and fall off; and the infection was soon communicated to a whole dairy, as was supposed by the hand of the person who milked. The animals suffered much in the operation of milking."

Professor Wall mentions that the symptoms are "blue or livid blotches on the teats and udder, painful and suppurating. The cows are seldom ill, so as to refuse their food. Others observe, that cows being naturally disposed to a lax habit of body, are not so much afflicted with feverish symptoms. Some say cows suffer no fever at all."

The testimony of several other correspondents have been already stated, that a cow has never been known to die of the cow-pox; to which I add in confirmation, that of the milk farmers near London.

VIII. No consequential disease, which should be attributed to the cow-pox has been observed; nor has any disease been excited, to which there previously existed a disposition; nor has it been discovered to produce a predisposition to particular diseases.

Although a considerable body of evidence might be stated in confirmation of these momentous facts, from the experience of Dr. Jenner, and the uniform testimony of my correspondent: and although we should be inclined to conclude in favor of these facts, from the consideration of the nature of the cow-pox, as far as yet known, yet it does not appear to my judgment that the observations and arguments warrant more than conclusions on the side of great probability. A number of persons, many hundreds, have gone through the inoculated small-pox; yet no one doubts that, in a certain proportion of instances, disease has been excited and disposition to disease been produced.

We are led then to think that a greater number, and more accurate observations are wanting, to authorise positive conclusions relating to the facts stated under this VIII head.

IX. The cow-pox infection may produce the peculiar local disease belonging to it, but without the difference of the constitution; in which case, the constitution is liable to be infected by the small-pox infection.

This fact is not of small consequence either in respect of general pathology or practice. Dr. Jenner's work, p 71, furnishes us with an unequivocal example of this fact. A woman was affected with the local disease of the cow-pox in the ordinary way, but without any pains or swelling of the axilla, or any disorder of the whole constitution, this person was subsequently afflicted by the small-pox; but a fellow-servant who had suffered with the cow pox, (at the same time and from the same source of infectious matter,) in which there was fever as well as local disease, could not be infected by inserting the small-pox poison; even repeated trials for this purpose were successless. Hence, they who offer as evidence instances of persons taking the small-pox after they have gone through the cow-pox, will do well to assure themselves that the whole constitution was affected in the cow-pox, otherwise such evidence will be inadmissible. Analogous facts have been ascertained, on good authority in the small-pox, although the instances are too scarce to afford too scrupulous minds full proof. It has been found that the usual loca disease of the inoculated small pox may occur, unattended by a disorder of the whole constitution; but yet the matter of such local small-pox will, in other persons, produce not only the local disease, but general eruption and fever; and that the person who had undergone this local small-pox only, will be infected at a future time, so as to have both the ordinary local disease and fever of the small-pox with eruptions.

It appears from the observations of Dr. Jenner, page 50, Mr. Drewe, Dr. Pulteney, and others, that during the cow-pox in the human subject, inflammation and sores are apt to be excited by the matter being lodged upon various parts, especially if the skin be divided; but no mention is made of fresh fever being excited, nor of the peculiar *livid* and *bluish* tint of the cow-pox pustulous sores. Enough has been said in a preceding part of this paper to direct observers in future to ascertain more accurately the effects of the agency of the cow-pox infection on the whole constitution, and on part of it only.

It will be necessary also to caution inquirers against the errors of admitting facts to belong to the cow-pox, as understood in this paper, which, in reality, belong to the chicken-pox, or swine-pox, in some provincial situations, are designated by the name of the cow-pox.

Yet another caution is necessary in investigating the truth, namely, to distinguish from the cow-pox. "the pustulous sores which appear spontaneously on the nipples of the cows; and instances have occurred, although very rarely, of the hands of the servants employed in milking being affected with sores in consequence, and even of their feeling an indisposition from absorption. These pustules are of a much milder nature than those which arise from that contagion, which constitutes the true cow-pox. They are always free from the bluish or livid tint so conspicuous in the pustules in that disease. No erysipelas attends them, nor do they show any phagedenic disposition, as in the other case; but quickly terminate in a scab, without creating any apparent disorder in the cow." Like the cow-pox, "this eruption appears most commonly in the spring, when the cows are first taken from their winter food, and fed with grass. Jenner, p. 7.

I observed during my visits to the cow stables near London, in August and September last, that a number of cows were infected with eruptions, sores and scabs on their breasts, especially on their paps. None of the animals had any constitutional affection, nor could I learn that any of the milkers were infected The eruptions now spoken of break out, as I was told, especially in new comers. Fresh cows, it was said, were apt to be thus affected, on account of the much richer food which is given in London than in the country. The same kind of sores, eruptions and scabs (which must be distinguished from the cow-pox), I apprehend are common in the country; of which the following testimonials will be useful.

Sir Isaac Pennington, who could not learn that the cow-pox was prevalent in Cambridgeshire, says, "I find cows are liable to inflammation of the udders, but they do not affect the hands of the milkers."

A number of milch cows are kept near Twickenham, and the Beauchamp* surgeon gave himself much trouble to oblige me, by making inquiries according to the direction of my queries. He instructs me, "that all the cow-keepers agree that warts, and small bladders, or pustules, appear frequently on the teats of the cow, but never observed the animal, or the milkers, to be affected, not even when these pustules were burst by the hands of milkers who had never suffered the small-pox.

Dr. Beckwith, of York, who well merits my best thanks, bestowed great pains in making inquiries among the medical practitioners in his neighborhood, and the farmers. His report is, "I† am well satisfied that no such disease as the cow-pox has ever appeared here in the memory of man; but soreness and chops of the paps are observed, from distension by milk in summer, never in winter, without affecting the hands of milkers."

In the *Pestes bovilla*, or murrain, the breasts, and especially the paps, are sometimes affected with pustules, or tubercles‡; which, however, seem to be in that disease the least of the unfavourable symptoms.

Dr. Belcombe, of Scarborough, in his obliging letter, observes,|| "there is a disease of the paps, which renders them exceedingly sore and difficult to milk, but it is not infectious, and the same cow has it many times; nor are the hands of the milkers ever sore from it. It commonly happens in hot and wet summers."

On considering the facts of the preceding history, it appears that some useful conclusions of a practical kind may be drawn from them.

I. The body of evidence is numerous and respectable, declaring that a person who has labored under the cow-pox fever, and local eruption, is not susceptible to the small-pox. It does not appear that a single well authenticated contravening instance has fallen under observation. But I do not apprehend that accurate and able reasoners will consider the fact as completely established; though I doubt not they will allow that the testimonies now produced greatly confirm the probability; and that the cautious appropriation of it, in practice, is warrantable.

In the present inquiry the attestations have been obtained from so many persons, that it seems highly improbable, indeed, that the contrary instances should have been unobserved, or purposely kept out of sight. If the fact had been supported by the testimony of one observer only, the experience of the world would have justified us in demanding the account of the failures; after the example of the keen skeptic of old, who, on being shown the native tablets of those who had been preserved from shipwreck, instead of yielding his assent, replied, "Where are the tablets of those who have perished?" §

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* Mr. Beauchamp's Letter, Trickenham, Sept. 18, 1798.

† Dr. Beckwith's Letter, York, Sept. 19, 1798.

‡ Illos duntaxat boves, and quidem admodum raros, mortem effugiffe quibus abscessus ac decubitus informam tuberculorum, scabici, depilationis, vel rhagadum, in uberum papillis fieri contegerit.—Lancisi de bovilla peste, pag. 3, tom. 2, No. 134.

|| Dr. Belcome Letter, Scarborough, Sept. 22, 1798.

§ Intellectus humanus in iis quæ semel placuerunt (aut quia recepta funt et credita, aut quia delectant) alia etiam omnia trahit ad suffragationem et consensum cum illis. Et licet major sit instantiarum vis et copia quæ occurrunt in contrarium; tamen eas aut non observat aut contemnit, aut distinguendo summovit et rejicit, non sine magno et pernicioso præjudicio quo prioribus illis syllepsibus authoritas maneat inviolata. Itaque recte respondit, qui, cum suspensa tabula in templo ei manstraretur eorum, qui vota solverant, quod naufragii periculo elapsi sint, atque interrogando premeretur, anne tum quidem eorum numen agnosceret, quæsivit denuo; *At ubi sunt illi depicti qui post vota nuncupata perierunt?*—Verulamii Novum Organum, Aphor. XLVI.

Granting the truth of this fact, its usefulness in practice, in contemplation of it as a substitute of the small-pox, must depend upon the effects of the cow-pox, in comparison with the small-pox, especially in the particulars *of the degree of danger to life; the kind of symptoms and their duration; and the subsequent effects on the constitution.*

1st. The evidences, showing that no one has ever died, or even been apparently in danger, are the same, as those for the fact itself; that a person is not susceptible of the small-pox after having suffered the cow-pox. But the conclusion, with respect to the point of danger, is far more equivocal. The comparison for this purpose should be made with not fewer than one, or even two thousand instances. For, though in several hundred examples of the cow-pox, which have been under observation, not one person has fallen a victim; this might, and indeed has been, the fortunate issue of the inoculated small-pox, of which it will suffice to give two instances.

Dr. William Heberden informs me, that at Hungerford, a few years ago, in the month of October, 800 poor persons were inoculated for the small-pox, without a single case of death. No exclusion was made on account of age, health, or any other circumstance, but pregnancy; one patient was 80 years of age; and many were at the breast, and in the state of toothing.

Dr. Woodville acquaints me, that in the current year, from January to August inclusive, out of upwards of 1700 patients inoculated at the Inoculation Hospital, including the *in* and *out* patients, *only two died,* both of whom were of the latter description.

Such instances of success can only be attributed to a certain favorable epidemic state of the human constitution itself, existing at particular times; for the proportion of deaths is usually much greater; indeed, sometimes it is very considerably greater, owing, probably, to certain unfavorable epidemic states. Of the various different estimates which have been made, the fairest seems to be that which states (under a choice of the most favorable known circumstances which can be commanded) one death out of two hundred inoculated persons. But when it is considered that we are not to make the comparison between the inoculated small-pox, and what may be called the *natural* cow-pox; when it is considered that the inoculated cow-pox, in respect of the local eruption and ulceration, is a much less painful and shorter disease than the natural, or casual cow-pox; when it is considered that the inoculated small-pox is especially dangerous from the number of eruptions, and that there is only a trifling local eruption of the part poisoned in the inoculated cow-pox; when it is considered that the cow-pox infection is not propagated in the state of effluvia. I say, from such considerations, it seems to be most reasonable to conclude, that *that there is great probability of the cow-pox either not proving fatal at all, or at most being much less frequently so than the inoculated small-pox.*

Further: the comparisen of the two diseases should be instituted, with respect to danger, under the particular circumstances of *Pregnancy; Age toothing; Peculiar morbid states; Peculiar healthy states, or Idiosyncracies; and certain seasons or epidemical states.*

Pregnancy. The inoculated small-pox is so commonly mortal to the unborn in every period of gestation; and so frequently so likewise to the mother in advanced states of gestation; that no prudent practitioner would choose to inoculate under these circumstances; but to escape the taking the disease by effluvia, in the casual way.* The exposure to infection, being sometimes unavoidable, I confess I feel anxious to ascertain the effects of inoculating the cow-pox infection in such persons. And on the grounds of the slightness and short duration of the cowpox eruptive fever and of the merely local eruption. I apprehend a practitioner would be justifiable in preferring the inoculation of the infection of this distemper to that of the small-pox.

On another account, the practice of inoculating the cow-pox seems recommendable in pregnancy, namely, that of preventing the irritable state of the womb, which is produced by abortion, during the small-pox. From which irritable state, the female will be very liable, in future, to the misfortune of abortions. This is so notorious a fact in brutes, that a cow which has suffered abortion, while laboring under the *Lues borilla*, or murrain, will seldom, in future, bring forth a live calf; and on this account such cow becomes greatly degraded in value. Whereas a cow, which has had the inoculated murrain when a calf, or at least before she was impregnated, is thereby greatly enhanced in value. It was the great Camper who recommended to his countrymen in Holland the general inoculation of calves for the murrain. The matter is most advantageously inserted into the ear, tail or dewlap.

Dr. Layard says, oxen may be inoculated, either with the pus of their eruptions, or with the mucus from the nose; and that few, comparatively with the casual disease, die. Oxen were not infected by eating matter of the pustules with their corn; not by covering their heads with a cloth, which had been impregnated with steam from the breathing of infected oxen.

Whether the unborn animal will take the infection of the cow-pox from the mother, is a question for future observation to determine.

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* See my paper *On the effects of the variolous infection on pregnant women.*—Medical Annals, Vol. IX, Decade 2d, 1795.

It has been fully determined antecedently to the recent controversy between two eminent anatomists for the honor of the discovery, by pathological observations, and demonstrated by anatomical* experiment and artifices, that the blood of the mother does not pass to the foetus, nor return from the foetus to the mother, for the unborn frequently escapes the disease of the smallpox, although the mother be affected with it; and when the foetus is infected, it is uniformly subsequent to the eruption, and even to suppuration of the pustules on the mother.† Further injections will pass from the umbilical arteries of the foetus into its body, and return by the umbilical vein, provided the placenta, or ricarious lungs of the foetus be entire. The foetus then does not receive its blood from the mother, nor does the blood of the foetus circulate through the mother. Yet the infant, before birth, frequently does receive some kinds of infectious matter from the mother, viz: the syphilitic, variolous, etc., and of consequence it seems possible that it may receive the cow-pox infection to its formation by the mother's constitution. In this case we should expect no local disease, but merely the specific fever.

Age. Whatever doubts may be entertained of very advanced or decrepit age being adverse to the success of the inoculated small-pox, I am sure that I shall be supported by the opinion and practice of a very decisive majority that *infancy* is the state in which the largest proportion die under inoculation. In medical families, and in large towns, where, to the reproach of our police, persons labouring under the small-pox are suffered to appear in the streets and public walks; even the most cautious practitioners deem inoculation of infants warrantable, but not even then otherwise than to avoid the casual disease. Of the effects of inoculation of infants with the cow-pox infection, we have but one or two examples; however, these are in favor of the practice.

Toothing. Though the tender, irritable state of a new-born child may be a more dangerous one with the small-pox, than even the state of actual great irritation during the cutting of teeth with this disease, yet the evidence in point of safety is against inoculating the small-pox in the latter cases. This being the fact, we shall feel inclined, under the circumstances of dentition, to inoculate for the cow-pox, if exposure to the small-pox infection be unavoidable.

Peculiar morbid states. Certain diseases have been found to have no influence in occasioning the inoculated small-pox to take place in a severe manner. On the contrary, it appears that some of these diseased states render the small-pox milder. But of the influence of such morbid conditions on the cow-pox, we possess no experience to authorize an opinion. There are some states induced by particular diseases, namely, by the measles, whooping-cough, etc, which are considered to be the occasion of severe disease in the inoculated small-pox; and from this consideration, under the circumstance of unavoidable exposure to the small-pox infection, it seems warrantable to prefer the inoculation of the cow-pox.

Peculiar states of health, Idiosyncracies. The cases of certain families in which the small-pox is uncommonly severe, and of other families in which it is very mild, are so frequent as to have fallen under the notice of every physician of experience. Some families have been so unfortunate that all their children have died in the small-pox, either in the casual way or by inoculation. It is not a very great rarity to find a family in which several children have fallen victims to the small-pox, and in which a single surviving child remains; in such case, the parents, and perhaps the child, are under constant apprehensions of the casual small-pox, for they are deterred from inoculation by what has happened. Surely, in such circumstances, one would be inclined to commend inoculation for tha cow-pox.

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* Succus nutritius et chylosus matris, ex poris et vasculis uterinis interventu membranæ villosæ tenuissimæ quæ chorio contigua est, non secus ac chylus a tunica intestinorum villosa recipitur, absorbetur, et per umbilicalem venam fertur, ex qua cum sanguine ad hepar infantis deducitur.——————————

Nutritur infans mediante succo temperato, gelatinoso matris, qui per spongiosam uteri substantiam transcolatur et a secundina recipitur, per cujus vasa ad infantem defertur.——

Ipsa secundina quatenus utero adhæret ex ejus substantia porosa succum alibilem, non vero sanguinem matris recipit—Crediderunt veteres, sanguinem matris nutrire infantem et vasa uteri cum vasis secundinæ et foetus invicem connectised notabile est, liquorem siphone umbilicales arterias injectum per venam umbilicalem redire, modo placenta illaesa fuerit; ex quo apparet, nullus dari anostomoses vasorum uteri cum vasis secundinae et foetus, neque sanguinem foetus rursus ad venas matris redire. Placenta uterina ex innumeris capillaribus minimis vasculis est contecta, per quao dum transit sanguis atteritur, comminuitur inque minimas partes ac globulos dividitur, intima unione succi nutritii cum sanguine facta, ut hac ratione per tenues canaliculos embryonis commodius transire et nutritionem praestare possit: unde revera secundina in foetibus vice fungitur pulmonem, qui in foetu a munere fuo vacant, quod identidem in intima sanguinis partium comminutione earumque unione cum chyloso succo consistit: qua de causa etiam vena umbilicalis id habet peculiare cum vena pulmonali ut sanguinem fluxilem floridum, et arterioso similem vehat quod omnibus aliis venis negatum est.—F. Hoffmann, t. 1 lib. 1 sect. 11. cap. XIII.

† See the paper above cited on the effects of variolous matter in pregnant women.

During certain seasons, or epidemical[*] *states.* At certain times, when the small-pox is epidemical, it is mostly violent and very fatal, and at other times it is mostly neither violent or very fatal.

Such different sorts of small-pox seem to depend upon prevalent peculiar states of health of people, rather than on the properties of the atmosphere. When an unfavorble epidemical state is discovered, the judicious practitioner will find the question worthy of his contemplation, whether it will not be justifiable to introduce the inoculation of the cow-pox to supercede the small-pox.

2. *The kind of symptoms and the duration* of the two diseases must be compared together. If an inoculator could, at his will, command an inoculation of the small-pox, a slight local affection, a trifling eruptive fever, and a very small number of eruptions, there would be no temptation held out on the force of symptoms to inoculate for the cow-pox, because, in this disease, it appears that we are liable, even by inoculation, to produce a painful phlegmonic inflammation, extensive and very irritating inflammation of the skin around the part poisoned, and ulceration of the phagedenic kind. A sufficient number of cases of the inoculated cow-pox has not been attested to enable us to form an accurate judgment of the degree of the symptoms in comparison with those of the inoculated small-pox. It does not appear that there is nearly so great a difference between the constitutional disorder, or fever, of the inoculated cow-pox, and of the casual cow-pox; as between the disorder of the constitution of the inoculated small-pox and the casual small-pox; nor, of course, are the advantages of the inoculated cow-pox so eminently great, comparatively with those of the casual disease, as the advantages of the inoculated small-pox are superior to those of this disease in the casual way. On comparison of the symptoms of the inoculated chicken-pox, the inoculated murrain, and the inoculated measles, with these diseases, in the casual way, by effluvia, the difference is not so great as to raise considerably our expectation of advantages from the practice of inoculation. Although Camper and Layard are advocates for inoculation for the murrain, Mons. de Berg gives a contrary opinion, declaring, [†]Que l'inoculation n'offre aucuns avantages reels; fur-tout dans les cas ou l'epizootic est tres-meurtriere, circonstance qui d'ailleurs est la seule dans laquelle elle puisse etre de quelque utilite.

3. *The subsequent effects on the constitution,* from the cow-pox, must be compared with those from the inoculated small-pox. A disposition to certain diseases, and even diseases themselves, are not rarely brought on by the small-pox; but sometimes also dispositions to diseases, and diseases themselves of the most inveterate kind, are removed by the small-pox. In families wherever certain dispositions to diseases are hereditary, and which diseases are known to have been excited by the small-pox, inoculation for the cow-pox on this account may be a considerable benefit; but that is on the supposition that no diseases, or morbid dispositions, are induced by it. As far as my inquiries have extended, I have found that no such morbid effects have ensued from the cow-pox; but I apprehend that many more observations than have hitherto been made, are requisite to ascertain this point satisfactorily.

Although pits from the small-pox are not a disease, they are at least a deformity, which it is of the greatest moment for any person to prevent; but which, however, no one can certainly guard against, even by inoculation; and as in the cow-pox, no such consequences take place, an inducement is afforded to inoculate for this disease.

II. As the small-pox infection is propagated in the state of effluvia, and by adhering in an unseen, and even invisibly small quantity, to cloths, furniture, etc.; but as the cow-pox infection is only propagated in a visible quantity, and for the most part only when applied to the divided cuticle, the means of avoiding the cow-pox are easy and obviously simple. On account of the extremely contagious nature of the variolous poison, the extensive dissemination of it by inoculation, and the practice of inoculating for the small-pox being only partial, it appears that the mortality by the small-pox has been in a greater proportion since than before the introduction of inoculation. And no sagacity is required to predict, that should the practice of inoculating for the cow-pox ever become very general amongst young persons, the variolous infection must be extinguished; and, of consequence, that loathsome and destructive disease, the small-pox, be known only by name. And this benefit will accrue, without even the alloy of the introduction of a new disease, it being plain from the nature of the cow-pox poison that it will be easy to avoid and prevent its dissemination.

III. The cow-pox poison appears to alter the human constitution, so as to render it unsusceptible of the agency of a different morbific poison, namely, of the variolous, in producing the small-pox. This fact is, I believe, quite a novelty in physiology and pathology; it indicates a new principle in the mode of prophylatic practice. And we now see upon what principle diseases from various other morbific poisons may possibly be prevented from taking place, such as the measles, ulcerous sore throat, whooping-cough, syphilis, etc., viz. in consequence of destroying the excitability of the constitution to such poisons by the agency of different and perhaps less hurtful ones. Whether the cow-pox preserves the constitution from other morbific poisons, besides the variolous, is an undecided question. This fact also suggests the idea that the economy of live beings may be liable to undergo permanent changes in the state of excitability of each, in respect of certain stimuli, both morbific and innocent ones, which observation has not hitherto discovered. And on account of the unobserved agency of such stimuli, some constitutions are utterly incapable, either permanently or for a limited time, of taking the small-pox, and perhaps other diseases. But if there are in nature means of rendering the human constitution unsusceptible, it must be allowed that it is probable there are also means of rendering it particularly disposed to certain diseases. And it is possible that the same constitution may, in the course of life, undergo repeatedly a temporary state of inexcitability to certain stimuli; but there is no reason to suppose that a state of inexcitability, which would otherwise be permanent, may be removed by certain morbific stimuli.

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[*] A very mild and innocent endemial small-pox occurred in the practice of Dr. Hicks, of which a history is expected by the professional public.

[†] Lettre a Mons. Linguet, p. 28, Appendix.

In the veterinary branch of physic it is a matter of still greater importance to possess the means of rendering the constitution unsusceptible of the agency of the morbific poison which produces the murrain; because,

1. This malady is more destructive when it is epizootic than the small-pox is among human creatures: 2. Because inoculation for it is not nearly so beneficial, a great proportion dying under inoculation.

It seems of small consequence in practice, but it is very important on account of physiology to determine, whether the human economy is rendered unsusceptible of the cow-pox by having undergone the small-pox In the instances related, of people taking the cow-pox who had gone through the small-pox, the observation was not directed with a view to determine, satisfactorily, whether the local affection was certainly attended or preceded by a constitutional affection.

IV. If it be true that the same constitution is liable to undergo repeatedly the cow-pox, to which distemper no one has fallen a victim, practitioners may avail themselves of this means of exciting an innocent fever as a remedy of various disorders, it being a truth, admitted by men of experience, that fevers are occasionally efficacious remedies, especially for inveterate chronic maladies, such as epilepsy, hysteria, insanity, St. Vitus' dance, tetanus, skin deformities and diseases, etc.

V. Concerning the ætiology of the disease, which is the subject of our inquiry: The cow-pox in the human animal has, in every casual instance of the disease, been so clearly traced immediately to the cow's breasts, affected with the cow-pox, that it would be mispending time to relate, particularly the history of cases, to prove what is asserted. The inoculation with matter from the cow produces the same disease as the casual cow-pox. It appears also that the cow-pox matter of the human animal excites the same disease as the matter from the cow. It has not been determined by experiment, nor by any observation of incidental agency of cow-pox matter; that this matter generated in the human animal, will excite the same disease in the cow; but from the facts just spoken of, probably few persons will doubt that this must be the case. The cow-pox of the brute is either excited by the matter conveyed from a beast laboring under the disease, (in an obvious way by the hands of milkers) to uninfected cows; in which manner one diseased beast may infect an unlimited number of beasts, or the disease is excited by aboriginal cow-pox matter; that is, by matter compounded in the animal economy of the cow, without any matter of the same kind having been applied. The means by the agency of which the animal economy is put into such a state as to compound this peculiar matter are not yet found out. A connection is, however, observed between the disease and the spring season, the autumn, and change from less nutritious to more nutritious food.

It has been concluded by Dr. Jenner that the aboriginal matter is from the matter of the grease of horses, which gains admission through the milkers who handle such greased horses: but this conclusion has no better support than the coincidence in some instances of the prevalence of the two diseases in the same farm, and in which the same servants are employed among the horses and cows. This assertion stands in need of support from other observations. The *experimentum crucis* seems to have been already instituted, but without success, namely, the inoculation with the grease matter of the cow's breast by Dr. Jenner. It is to excite further research, that I shall mention how successful my inquiries have been to find the origin of the cow-pox to be in the grease.

1. I have found that in many farms the cow-pox breaks out, althoughno new-comer has been introduced into the herd; although the milkers do not come in contact with horses; although there are no greased horses; and even although there are no horses kept on the farm.

2. It appears that the cow-pox does not break out under the most favorable circumstances for its production, if it be occasioned by the grease. Through the application of my inestimable colleague, Dr. Wm. Heberden, I have got much instruction relating to this head from Sir Isaac Pennington. "I[*] have had," says Sir Isaac, "Dr. Jenner's book some weeks, and the particulars stated in it are really astonishing. I have made inquiries upon the subject at Cottenham and Willingham; in which two parishes 3005 milch cows are kept, also a great many horses of the rough-legged cart kind, (much liable to the scratches or grease,) half the parishes being under the plow, and the men being much employed in milking. But I cannot find that any pustulous eruptions on the teats of the cow, or on the hands of the milkers, have ever been heard of, and what seems to prove the negative in this case, I understand inoculation succeeds just as well in these parishes as anywhere else. I cannot find from those concerned in inoculation that shoeing-smiths are less liable to the infection of the small-pox than other people."

Dr. Parr is one of the few men of learning, and acknowledged ability, who has imbibed an unfavorable opinion of the whole of the facts and reasoning of Dr. Jenner. But as my Exeter friend merely opposes reasoning and gratuitous suppositions, to at least some well-attested facts, I do not think anything will be gained by stating, particularly, his sentiments on the subject, yet I acquiesce to his judgment, "that the assertion that the cow-pox proceeds from the heels of horses is gratuitous." He reprobates the conclusions on this part of the subject in somewhat opprobrious terms, in which, however, the Doctor himself argues more on gratuitous suppositions than admitted truths.

"Limpid[†] fluid is always more active than pus, for a wound no longer spreads when the matter becomes purulent. If a disease does proceed from the matter of the heel of the horse, it is no other than such as occurs in the human subject, namely, topical ulcers, from a putrid fomes; since it is probable, (p. 49, Jenner) on Dr. Jenner's own foundation, the eruptions must precede its influence. Men servants seldom milk cows in this country, and when they do, such insufferable dirtiness as to milk with hands streaming with the running of a sore heel, would not be tolerated in any milking court in this country. Indeed, I think this publication (Dr. Jenner's) is a libel on his own neighborhood."

At the close of these adverse observations, it is but fair to represent that this opinion respecting the origin of the cow-pox, is not merely that of Dr. Jenner, for Mr. Smith (letter above cited) says, "Mr. Woodman had a notion of the cow-pox originating from the sore heels of horses." And several male servants at the milk farms near London said, "there was such a notion entertained in several parts in the country, whatever might be its foundation."

The cow-pox poison, and the hydrophobic poison, are the only specific morbific matter to the human animal economy which are clearly proved to be derived from brute animals; for there is only small probability on the side of the opinion that the syphilitic poison is from the bull[‡], the small-pox from the camel[‖] and the itch from the dog. The economy then of the human kind, and of cows, resemble, in the particular of being excitable to a disease, the cow-pox, by a certain specific poison. Whether other animals, especially males of the bovine kind, can take the cow-pox has not been determined by experiment or accidental observation. Morbific poisons, which produce specific diseases, act in this way only on one species of animals, except in a few instances, such as the hydrophobic and cow-pox poisons. Camper, Ingenhousz and Woodville in vain attempted to produce the small-pox by inoculation in a number of different brute animals.[§] J. Hunter failed in attempting to excite the syphilis in a dog by inoculating him with the poison of the gonorrhœ and of a syphilitic ulcer. Camper attests that in the most malignant epizootic murrain, which spread most rapidly among oxen, yet other animals, such as sheep, horses, asses, dogs, etc., were not infected by associating with the distempered oxen, nor even by feeding with them in the same compartments of a stable.

In the eruptive contagious disease among sheep in France forty years ago, other species of animals which associated with them were not infected.

The newly-observed disease, which prevailed among domestic cats in 1796, throughout great part of Europe, and even America, did not appear to affect other animals.

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[*] Sir Isaac Pennington's Letter, Cambridge, Sept. 14, 1798.

[†] Dr. Parr's, M. D., Letter, Exeter, July 22, 1798.

[‡] Bulls so diseased are said to be stung.—Sir Isaac Pennington's Letter.

[‖] See Bruce's Travels and Dr. Woodville's History of Inoculation.

[§] Berrier, of Chartres, asserts that monkeys, dogs, sheep, rabbits, oxen and other brute animals, are susceptible of the small-pox; but his evidence has not the weight of a feather against the contrary authorities. Swediaur asserts that monkeys are never affected with the syphilis, although in England they are subject to the scrofula, and that other animals are equally unsusceptible of the syphilis, although Pauw affirms that in Peru dogs are affected with this disease, These observations may serve to remove the fears of those who apprehend, that in consequence of domesticating brute creatures, we are liable to render their diseases endemial.

VI. As it appears that the cow-pox poison, after its admission into the human constitution, takes effect, or sensibly exerts its agency upon the whole economy, in seven or eight days, it seems probable that it will anticipate, in many instances, the agency of the small-pox poison, if the two poisons be introduced at the same time, or nearly so; in which case the patients should be in future incapable of the small-pox.

If the morbific poison of the varicella, or chicken-pox, were to be inserted at the same time with the cow-pox poison, it is probable also that the cow-pox would suspend the chicken-pox, and perhaps render the constitution unsusceptible of its action in future. But if it be a truth that the rubeolous poison can be inserted by inoculation, and that it affects the constitution in six days, when this poison and that of the cow-pox are introduced at the same time, it is most likely the measles will suspend the cow-pox.

So long as the constitution is under the agency of the cow-pox poison, it is not probable that it will be infected by those morbific poisons whose existence is only known by their effects, (for they operate in too minute a quantity to fall under the notice of our senses) namely, the poison which occasions the influenza, whooping-cough, ulcerous angina, that which occasions the typhus fever, the miasmata and the contagion of intermittent fevers, etc.

To give an instance of the application of facts to practice: if a woman be far advanced in pregnancy, and exposure to small-pox infection has been, or is unavoidable, in that case it will be of vast importance to avert the present impending danger from the female. Under such a circumstance the temptation to inoculate for the cow-pox will be felt by the practitioner. And provided the inoculation be instituted in not more than six or seven days after exposure to the variolous infection, it should, according to principle, pretty certainly preserve the patient from small-pox; or if it be done within ten or twelve days, it should frequently answer the purpose. For the variolous poison lies within the human body, most frequently, fifteen days, and often four or five days later, before its general agency is perceived; whereas, the cow-pox poison acts upon the whole constitution in seven or eight days after its admission.

VII. The cow-pox poison is, according to the present facts, totally different in its nature and effects from every other morbific poison, both of cattle and human creatures. It is not necessary to enter minutely into the distinguishing characters of it as it appears in cows, as these will be collected from the history of the disease. I think it right just to mention that care should be taken not to confound the cow-pox with the common wart eruptions and inflammations ending in scabs, which affect the paps only, or at most the paps and the udders. It must also be recollected that the cow-pox is quite different from the diseases of cattle which are attended with eruptions of the skin in general, such as take place in the murrain, or *pestis bovilla*, already spoken of, on which eruptive diseases more has been written by the Italian, French and Dutch physicians than by the English[*].

On account of the notion which, by some, is entertained, that the cow-pox infection is of the same nature as the variolous, it may be useful to point out the great differences between them.

1. The cow-pox poison, introduced by inoculation, affects the whole constitution at the same time in the same degree and manner as when admitted in the casual way; and if the local affection be more severe in the casual than in the inoculated way, it seems to be owing to the structure of the part, namely, the thick cuticle in the palms of the hands.

2. The cow-pox poison only affects the constitution through the intervention of the part poisoned.

3. This morbific poison produces no eruption or inflammation, but of and near the part to which the poison is applied.

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[*] Gli assistenzi a'bovi ammalati e molt' altri nomini degni di fede m'attestarono d'aver osservati, in alcuni tumori crudi in diverse parti del corpo con lingue aride, nere e tagliate, in altri aver veduti tumori maturate.—P. A. Michelloti, p. 12, 1711.

La terza osservazione fu circa alcuni buovi, che dimorarano in ima stalla come alle pecore: due di essi cacciarono d' alla cute certi tubercolletti.—Padre Boromeo, p. 48.

Annis 1713, 1714, in nostro Ferrariensi Ducatu, lues contagiosa beum, &c. Correpti enim boves cibum respuebant; aures subito collapsæ procidebant: pili erigebantur; tremor pene universalis aderat: oculi lacrymabant: per nares multa lymphæ copia exibat; alvus solvebatur · et in aliquibus pustulæ sub cute prodibant, ita ut crederent aliqui Variolis boves ipsos assici; tandemque brevi septem dierum spatio moriebantur.—J. Lanzoni, t. 20, p. 202.

Maculis denique et pustulis infecta cutis, adeo ut quibusdam, in mentem venerit cogitare boves non leu, ut nunc res est, sed ipsis pustulis quas Variolas vocant interire.—J. M. Lancisi de bovilla peste.

Schreiben an die Generalstaaten betreffend die Einimpfung der Viehseuche geschrieben den 16 Febr. 1770.—Camper von Einimpfung der Rindviehseuche, ihren Vortheilen und Bedingungen.—Campers Berliner Gesellschaft.

4. The cow-pox poison from the human subject will, in all probability, infect the cow with the cow-pox, which the variolous poison will not.
5. It is asserted that a person may have the cow-pox who has had the small-pox.
6. The local pustulous eruptions in the cow-pox are rather in the nature of vesicles, or phylyctaræ, than purulent eruptions, and the ulceration is apt to be of the phagedenic kind.
7. The tow.pox infection is not propagated in the state of effluvia or gas.
8. Cow-pox matter applied to the eyes, lips and various other soft parts, or to any parts which are punctured, or wounded, in persons who already have had the cow-pox, or are then ill of the disease, will excite the peculiar local affection from this poison, and perhaps fever.

VIII. There are some who are not certain whether or not they have gone through the small-pox, yet they have such a dread of the disease as not to submit even to inoculation for it. To such persons the inoculation for the cow-pox as a substitute for the small-pox must prove a happy discovery.

Some who have never gone through the small-pox have been repeatedly inoculated for the small-pox, and also been exposed much to the infection of it in the casual way, yet could not be infected. Persons so circumstanced to be more secure, may be inoculated for the cow-pox.

Such is the representation which I shall lay before the public of the benefits likely to accrue to human society from inoculation for the cow-pox. I shall be no better contented with those who will consider the facts to be already completely demonstrated, than with the opposite extreme opinion, that the whole of the prospects displayed are merely Eutopian. The fortunes of the new proposed practice cannot, with certainty, be told at present by the most discerning minds. More instances are required to establish practical and pathological truths Without assuming pretensions which, I think, unwarrantable, the number of instances farther requisite can not be stated; but one may safely assert that well directed observation in a thousand cases of inoculated cow-pox would not fail to produce such a valuable body of evidence as will enable us to apply our knowledge with much usefulness in practice, and establish, or at least bring us nearer the establishment, of some truths.

They who take a part in the present inquiry must not expect to escape detraction. But such a prospect will not divert him from his path who labors in the culture of physic for the satisfaction of his own mind, well knowing that it argues egregious ignorance of what is passing in the world, to do so from any other motive.

COMMUNICATIONS RECEIVED AFTER THE PRECEDING SHEETS WERE PRINTED, AND ADDITIONAL OBSERVATIONS.

Mr. Rolph, Surgeon in Peckham, practiced physic nine years at Thornbury in Gloucestershire. During two of these years he was the colleague of the late Mr. Grove, who had been a medical practitioner at Thornbury for near forty years. The greater part of the facts above stated, relating to the cow-pox, are familiarly known to Mr. Rolph from his own observation, and from the experience of Mr. Grove.

Mr. Rolph tells me, that in Gloucestershire the cow-pox is frequently epizootic in the dairy farms in the spring season. It especially breaks out in cows newly introduced into the herds. When a number of cows in a farm are at the same time affected, the infection seems generally to have originated in the constitution of some one cow, and before the milker is aware of the existence of the disease, the infectious matter is probably conveyed by the hands to the teats and udders of other cows; hence they are infected. For if the disease in the cow first affected be perceived in a certain state, and obvious precautions be taken, the infection does not spread, but is confined to a single beast. Whether the morbific poison is generated in the cow first diseased in a given farm, *de novo*, from time to time, and disseminated among the rest of the herd; or, like the small-pox poison, is only communicated from animals of the same species to one another, is not ascertained. No cow has been known to die or be in danger from this disorder.

A great number of instances of the cow-pox in milkers had fallen under Mr. Rolph's observation, and many hundreds more under that of his late partner, Mr. Grove; but not a single mortal, or even dangerous, case had occurred. The patients were ordinarily ill of a slight fever for two or three days, and the local affection was so slight that the assistance of medical practitioners was rarely required. He had no doubt that the inoculated cow-pox was attended with as little pain and uneasiness as the ordinary cases of inoculated small-pox.

Mr. Rolph says, there is not a medical practitioner of even little experience in Gloucestershire, or scarce a dairy farmer, who does not know from his own experience, or that of others, that persons who have suffered the cow-pox are exempted from the agency of the variolous poison.

The late Mr. Grove was a very extensive small-pox inoculator, frequently having 200 or 300 patients at one time, and the fact of exemption now asserted had been long before his death abundantly established by his experience of many scores of subjects who had previously labored under the cow-pox, being found unsusceptible to the small-pox, either by inoculation or by effluvia.

While Mr. Rolph practiced at Thornbury, he thinks not fewer than three-score instances of failure in attempting to produce the small-pox by inoculation occurred in his own practice, all of which were persons who had been previously affected with the cow-pox. In almost all of these cases the uninfected persons associated with those who took the small-pox, and many were repeatedly inoculated. Although Mr. Rolph has not, in his recollection, any instances of people taking the small-pox who gave admissible evidence of their having labored under the cow-pox, he thinks such cases may, and have indeed occurred to others, where the cow-pox had been *only* local, it being requisite that the whole constitution should be affected in order to destroy the excitability to the variolous poison.

Mr. Rolph declared that his confidence in the efficacy and safety of inoculation for the cow-pox was such that he regretted he could not, at present, procure cow-pox matter to inoculate two of his own children who had not yet had the small-pox. This measure is, however, determined upon.

As a particular instance, Mr. Rolph related the following: A soldier's wife, while in the small-pox, was accidentally in the company of several farmers at an ale-house in Thornbury. Two of the company who had gone through the cow-pox, but not the small-pox, were not infected by the variolous infection; but three others, who had not labored under the cow-pox, took the small-pox.

Mr. Rolph's mind was not satisfied that a person could be constitutionally affected by the cow-pox poison more than once, but he had no doubt that the local affection might be produced repeatedly. Neither did he certainly know that a person was unsusceptible of the small-pox who had been constitutionally affected by the cow-pox.

Mr. Rolph, in a letter to Dr. Beddoes, dated June 10th, 1795, communicated the following observations. Speaking of a man who could not be infected, although he was repeatedly inoculated for the small-pox, and although he lived in the same room with another man who died of the small-pox, Mr. Rolph says, "it is worthy* of remark that this man had some years before a complaint incident to cows, and commonly called the cow-pox, a malady more unpleasant than dangerous. It is generally received by contact in milking. In the human species, the complaint is sometimes local, at other times absorption takes place, and the glands in the course of the absorbents become indurated and painful. When this is the case, *I have learned from my own observation, and the testimony of some old practitioners, that susceptibility to the small-pox is destroyed.* Some advantage may probably, in time, be derived from this fact."

LETTER FROM DR. JENNER TO DR. PEARSON.

CHELTENHAM, 27th September, 1798.

My Dear Sir—The perusal of your proof sheets has afforded me great pleasure, both from the handsome manner in which you mention my name, and from the mass of evidence which has poured in upon you from different countries in support of the fact which I so ardently wish to see established on a steady and durable basis

Your first query respecting the foetus in utero I can not resolve.

With respect to your second, you may be assured that a person may be repeatedly affected, both locally and generally, by the cow-pox, two instances of which I have adduced, and have many more in my recollection. But, nevertheless, on this important point, I have some reason to suspect that my discriminations have not been, till lately, sufficiently nice. I must observe to you, that what the constitution feels from the absorption of the virus†, is of a mild and transient nature, but the sores (which sores, when casual, are often numerous, and attended with such soreness and inflammation) are sufficient of themselves to occasion much disorder in the system. Certain it is, that the skin is always subject to the ulcerative effects of the virus, but whether the constitution can repeatedly feel the primary effects of it, I have experiments in view to determine. Let me here call your attention to a similarity between the small-pox and the cow-pox. The symptoms of absorption first disturb the system, and, secondly, the system feels the consequences of the local sores. Exactly so with the cow-pox; and as the cow-pox inflammation is always of the erysipelatous kind, when it spreads over the skin to any great extent, it produces symptoms not unlike the confluent small-pox

It is painful to me to tell you, that I have not an atom of the matter that I can depend upon for continuing the experiments. Mr. — ——, when he inoculated the boy, did not take matter early enough from the pustule to secure its efficacy,—for after it has lost its limpid quality, and becomes pus, I fear its specific effects cease. Much precaution is therefore necessary in the progress of the inquiry; and this is my grand fear, that the discovery may fall into discredit from a want of that attention, in conducting the experiments which the subject requires. For example, a person may conceive he has the cow-pox matter on his lancet, when, in fact, there may be only a little putrid pus—with this he scratches the skin and excites disease;—the patient is afterwards subjected to the insertion of the variolous poison, and unquestionably will have the disease. Thus a delusive inference will be drawn, at once hurtful to the cause, and particularly injurious to me. However, truth must appear at last, and *from your researches, its appearance will certainly be expedited.* I remain, yours very truly, E. JENNER.

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* See the queries of Dr. Beddoes concerning inoculation, subjoined to his translation of Gimbernet's method of operating for the femoral hernia.—London, Johnson, 1795.

† I use this expression as the common language of the day, without consenting to the truth of it.

Abstract of a Letter from Mr. Fewster, Surgeon in Thornbury, dated October 11th, 1798, to Mr. Ralph, Surgeon in Peckham.

In the spring of the year 1768 I came to live at Thornbury, where I have resided ever since. In that very year, from the following occurrence, I became well acquainted with the disease called cow-pox. The late Mr. Grove and myself formed a connection with Mr. Sutton, the celebrated inoculator; and to inoculate for the small-pox, we took a house at Buckover. We found in this practice that a great number of patients could not be infected with the small-pox poison, notwithstanding repeated exposure under most favorable circumstances for taking the disease. At length the cause of the failure was discovered from the case of a farmer who was inoculated several times ineffectually, yet he assured us he had never suffered the small pox, but, says he, "*I have had the cow-pox lately to a violent degree, if that's any odds.*" We took the hint, and, on inquiry, found that all those who were uninfectable had undergone the cow-pox. I communicated this fact to a medical society, of which I was then a member, and ever afterwards paid particular attention to determine the fact. I can now, with truth, affirm *that I have not been able to produce the small-pox, in a single instance, among persons who have had the true cow.pox*, except a doubtful case which you are acquainted with. I have, since that, inoculated near two thousand for the small-pox, amongst whom there were a great number who had gone through the cow-pox; the exact number of these I can not tell, but I know that they all resisted the infection of variolous matter.

With regard to your questions:

1. As to danger from the cow-pox. In the course of thirty years I have known numberless instances of the disease, but never knew one mortal, or even dangerous, case.
2. Is a person susceptible of the cow-pox more than once? I can not answer this question.
3. Is the cow-pox, in the natural way, a more or less severe disease than the inoculated cow-pox? I think it is a much more severe disease in general than the inoculated small-pox. I do not see any great advantage from inoculation for the cow pox. Inoculation for the small-pox seems to be so well understood, that there is very little need of a substitute. It is curious, however, and may lead to other improvements*.
4. Have you ever known any pregnant woman labor under the cow-pox? Yes, many, but it *never produced abortion*. The state of the foetus I can not speak of.
5. Are cows affected at certain times more than at others? They are especially effected from February to May, when there is the greatest number of greased horses.

I can not procure any cow-pox matter this season.

From Mr. Bird to Dr. Pearson, October 16, 1798.

Mr. G. G. Bird, of Hereford, who is now attending medical lectures in London, tells Dr. P. that he has very often seen the cow-pox in cows and human creatures near Gloucester; that it attacks the same person repeatedly, and once the third attack was observed to be more severe than the preceding ones, but ordinarily the reverse is the fact. It appears with red spots on the hands, which enlarge, become roundish and suppurate, tumors take place in the armpit, the pulse grows quick, the head aches, pains are felt in the back and limbs, with sometimes vomiting and delirium. It is most common in a wet spring. No one dies of the disease.

Dr. Currie, of Chester, informs Mr. Thomas that the disease called cow-pox is unknown to the medical practitioners and farmers in Cheshire.

Dr Richard Pearson, of Birmingham, in his obliging letter of the 26th September last, says, "From this united evidence, (that of medical persons and farmers) I think that it may be inferred that the disease, which Dr. Jenner calls variolæ vaccinæ, is not epizootic in the counties of Warwick, Worcester and Stafford."

Dr. Woodville acquaints me, "that not being able to procure cow-pox matter he is making trials with grease matter from which no doubt, some useful information will be obtained."

Extracts of a letter from Mr. Thomas Wales, surgeon at Downham, Norfolk, dated October 18, 1798, to Dr. Pearson. I shall endeavor to give you satifactory answers to your queries.

Previous to my conversation with Dr. Redfearn, I had no knowiedge of the disease called cow-pox, nor was it known to any medical practioner in this district But on inquiring at the dairy farms, I have got much information concerning the disease. I this day saw two persons wao have had the cow-pox. One of them, a man above sixty years of ago, who has been a milker all his life, knows the disease very well by the name of pap pox, having himself experienced the disorder a great many years ago. He remembers that on that occasion he was sick at the stomach and otherwise ill for two or three days. The eruption on his hands was considerable, and the fingers were swollen; probably owing to improper applications the places healed slowly, and left scars, which are evident at this day; and when the hands are very cold, these scars are of a livid cast. He had not gone through the small-pox before he had the cow-pox nor has he had the small-pox since this disease, although he has been repeatedly inoculated.

The other case above mentioned, is that of a young woman, who had the cow-pox some time ago but never suffered the small-box although she has been several times inoculated.

There are, I find, many other instances, of persons who have gone through the cow–pox, and who have not been able to take the small pox, either naturally, or by inoculation.

As the public in this part are not at all aware of the advantages of inoculation for the cow-pox, there are no instances of this mode of producing it.

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* I have stated the writer's opinion of inoculation for the cow-pox, in obedience to a law imposed on myself, of not suppressing any part of the evidence communicated, however differently I might reason on the acts.—Note by the author of this inquiry.

I do not find that any person has had the cow-pox more than once, that is a fever with the local affection more than once; but the local affection without fever, has occurred in the same person repeatedly; I have met with two cases, in which the matter of the cow.pox, by being applied to the eyes, destroyed the power of vision, from the opacity of the cornea so produced.

No person has been known to die, or even to be in danger, with the cow-pox, although the axillary glands have been much affected, and the sores on the hands have healed with difficulty. I have not met with a case of a woman who has gone through the disease during pregnancy.

No instance has fallen under my observation, of a person who has gone through the cow-pox after having had the small-pox.

With regard to cows they are subject to the cow-pox more than once. It comes on in the spring, when they first begin to taste luxuriant food, but not uniformly every year. One farmer informed me that he thought it broke out especially when the cows were fed with turnips in autumn; but I do not depend much on this observation."

REMARKS ON THE TERM VARIOLÆ VACCINÆ.

For the sake of precision in language, and of consequence, justness in thinking; and considering that there is no other way of disabusing ourselves from many of the errors in physic, but by the use of just terms; it is not unworthy of our attention to guard against the admission of newly appropriated names which will mislead by their former accepted import.

Variola is an assumed Latin word, and its meaning will be popularly understood in the English tongue, by saying that it is a name of a disease, better known by another name, the small-pox. Granting that the word variola is a derivative from *varius* and *varus* used by Pliny and Celens to denote a disease, with spots on the skin the etymological import of variola is any cutaneous spotted distemper; but one of the most formidable and distinct of the cutaneous order is what is called the small-pox, and therefore, as I apprehend the name variola has been used technically to signify this kind of spotted malady, and no other.

Now as the cow-pox is a specially different distemper from the small-pox, in essential particulars, namely, in the nature of its morbific poison, and in its symptoms; although the cow-pox may render the constitution not susceptible of the small-pox; it is a palpable *catachresis* to designate what is called the cow-pox, by the denomination *variolæ vaccinæ*; for that is to say, in English, cow small-pox, and yet the cow is unsusceptible of infection by the variolous poison.

To the name cow-pox or better, perhaps *cow-pocken*[*] in our language, I think no reasonable objection can be urged. According to the more distinct and lucid arrangement of cutaneous distempers, by Dr. Willan,[†] the cow-pox belongs to the order entitled *pustulas*; the word *pock* is known to signify *pustule* and the prefix cow denotes the only animal in which the morbific poison has its origin. Further; if hereafter by the practice of universal inoculation, the human animal should be much more abundant, and better known source of this morbific matter than the brute animal, it is fit that the latter, to which obligations will be owing for an inestimable benefit, should live in the grateful memory of mankind, as ought also the name of Jenner who will be so great a public benefactor.

QUERIES.

It may save some persons the trouble of thinking, and time, if a set of questions be stated; which will serve to guide observation in the acquisition of facts belonging to the subject of inquiry. For this purpose the following queries are proposed:

WITH RESPECT TO BRUTES.

1. If a distemper of cows has been noticed, called the cow-pox, or by any other name, in which the beasts, especially the paps, are affected with pustulous, and generally purple, or livid eruptions and sores, by which the hands of milkers are infected; what are the symptoms?
2. Can any connection be traced betwixt this disease and the grease of horses' heels? between the disease and particular kinds of food and water? between it and any particular state of the athmosphere? between it and any particular season?
3. Is the same liable to the disease more than once?
4. Has any cow ever appeared to die of this disease?
5. Is the cow susceptible of the cow-pox by the inoculation of the breasts, with grease matter of horses?
6. Are males of the ox kind, or other different kinds of brutes, susceptible of the disease by inoculation with cow-pox matter of cows?
7. Have cows in a state of pregnancy been observed to be affected with this distemper?
8. Is the cow susceptible of the disease by inoculation of other parts beside the breasts?
9. Is the cow-pox matter of human creatures capable of producing cow-pox in cows?

WITH RESPECT TO HUMAN CREATURES.

1. What parts are affected, and what are the symptoms of the distemper when contracted in the casual way?

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[*] Instead of the modern orthography small-pox, etc , in which *es* and *eks* are denoted by *x*, it will be, perhaps, thought preferable to follow the original orthography *pock* with its plural *pocken*, as the Germans still do; from whose language we have received the words.

[†] Description and treatment of cutaneous disorders. Order 1. Pustulous eruptions on the skin, by Robert Willan, F. A. S. 4to. with plates, Johnson. 1798.

2. Has any person been supposed to be in danger, or to have died of the disease?

3. Is the whole constitution disordered previously, or *only at the same time* the pustules break out? Does the disorder of the constitution disappear on the appearance of the pustules? Does the same, or a different disorder of the constitution again appear; and under what circumstances in the course of the disease?

4. If in the course of the disease, when there is no disorder of the whole constitution, the infectious matter of the cow or of the human patient already laboring under the cow-pox be applied to fresh parts, does a disorder of the whole constitution arise, as well as a local affection; and of the same kind as those which have already taken place?

5. Is the same person susceptible of the cow-pox local affection, and fever, or disorder of the whole constitution more than once or only of the local affection more than once? In the instances in which the disorder of the whole constitution was said to have occurred more than once, is it not probable that in one case only the specific fever of the infection occurred, and in the others a different disorder of the whole constitution, such as was merely from the irritation of the local affection?

6. Is the local affection of the same nature on a second, or on further attacks in the same as on the first?

7. In the instances of cow-pox in persons who had gone through the small-pox, were the local affection and disorder of the constitution of the same nature as in persons who had not labored under the small-pox?

8. Has it been observed that a person has ever taken the small-pox after having gone through the cow-pox? In the instances in which the small-pox was said to have taken place, was it certain that the preceding cow-pox was attendant with its specific fever, or was there only a local affection, or at most, was there only disorder symtomatic of the local affection?

9. Does the cow-pox render the human constitution unsusceptible of any other disease besides the small-pox; or on the contrary, increase its susceptibility to any particular disease?

10. What are the effects of cow-pox on pregnant women?

11. In the inoculated cow-pox is the fever less considerable than in the casual way?

12. In the inoculated cow-pox is the local fever slighter and of shorter duration than in the casual cow-pox?

13. How long after the insertion of the matter is it before the constitution is affected?

14. If a person were to be inoculated at the same time with cow-pox and variolous matter, which disorder would appear first, or what other effects would be produced?

15. If the cow-pox morbific matter be applied to a secreting membrane, e. g. to the urethra, will it produce a gonorrhœa or pustulous sores?

16. Does the disease appear to injure the constitution, by producing or exciting other diseases?

17. Does the disease appear to eradicate any other disease already present?

18. Does the mildness or severity of the inoculated cow-pox depend upon the quantity of the matter inserted, or on the wounds inflicted for inoculation?

19. Does the cow-pox matter produce the disease as certainly in its dried as its fluid state; and when old as when recent; and with equal mildness?

20. Are there any particular states of the constitution in which cow-pox is particularly mild; or on the contrary, severe; as after the measles, whooping-cough, etc.?

21. Are there particular idiosyncrasies in families or individuals, which influence the cow-pox, as is the case in the small-pox?

22. Is the inoculation of the cow-pox equally successful in infancy, manhood, and decrepit age?

Answers to the preceding questions will be principally obtained by inoculation for the cow-pox, of which there are many opportunities in provincial situations; which practice it is one of the chief objects of this publication to encourage.

23. Do certain epidemic states appear to prevail, which influence this disease?

P. S.—Extracts of a letter from Dr. Fowler to Dr. Pearson, dated Sarum, October, 24, 1798:

> *My Dear Sir*—The disease called cow-pox is known in this neighborhood only to a few farmers, but they understand that it is a preservative from the small pox. This morning, Anne Francis, a servant girl, aged 25 years, was brought to me; she informs me, that some years ago bluish pustules arose on her hands, from milking cows diseased by the cow-pox. These pustules soon became scabs, which falling off, discovered ulcerating and very painful, which were treated by a cow doctor, and were long in healing. Some milk from one of the diseased cows having spurted on the cheek of her sister, and on the breast of her mistress, produced on these parts of both *persons, pustules* and sores, similar to her own on her hands. None of

these three had suffered the small-pox, nor have they gone through it since that time, although they have been much exposed to the infection; and the sister above mentioned has been inoculated three times for the small-pox. The cow doctor who attended these three women said, he would forfeit his life if any of them should afterwards have the small-pox.

With sincerest good wishes for the success of this and all your undertakings,

I am, etc., etc. R. FOWLER.

Note—Mr. Hughes' letter, dated Stroud-Water, Gloucestershire, October 27, 1798, to Mr. Bliss, Surgeon. Hampstead, has been just sent to the author, in answer to his queries. Unfortunately this valuable letter cannot now be published. It especially confirms, by a number of instances, the facts of the safety of the cow-pox, and of its producing unsusceptibility of the small-pox.

FINIS.

REPORTS OF A SERIES OF INOCULATIONS

—FOR THE—

VARIOLÆ VACCINÆ, OR COW POX;

—WITH—

REMARKS AND OBSERVATIONS ON THIS DISEASE, CONSIDERED AS A SUBSTITUTE

—FOR—

THE SMALL-POX,

By **WILLIAM WOODVILLE**, M. D., Physician to the Small-Pox and Inoculation Hospitals.

LONDON:
Printed and Sold by James Phillips & Son, George Yard, Lombard street. 1799.

TO THE RIGHT HONORABLE SIR JOSEPH BANKS, BART.

Knight of the Bath, President of the Royal Society, etc.:

Sir—The great attention with which you honored some of the first cases described in the following sheets has induced me to hope, that on account of the whole, though not affording the satisfactory evidence upon the subject that I expected, may still not be entirely unacceptable to you.

I have the honor to be with the utmost regard, your obedient servant,

W. WOODVILLE.

Ely-Place, May 16, 1799.

[illegible]

[illegible] similar fever not compl

[illegible] appeared.

REPORTS, ETC.

Last summer Dr. Jenner presented to the public[*] several curious and interesting facts, respecting a disease known to dairy farmers by the name of cow-pox. The most important of these is, that persons who have been effected with this distemper are thereby rendered as secure from the effects of the variolous infection as if they had actually undergone the small-pox.

However extraordinary this circumstance may appear, it is supported by numerous experiments made under Dr. Jenner's inspection, and also by concurrent testimonies since collected by Dr. Pearson,[†] who with much laudable zeal and industry instituted a further inquiry into the subject.

Dr. Jenner, who from his situation in Gloucestershire, had many opportunities of seeing the cow-pox, supposes it to originate from the grease in horses, and to take place in the following manner:

"In this dairy country a great number of cows are kept, and the office of milking is performed indiscriminately by men and maid servants. One of the former having been appointed to apply dressings to the heels of a horse affected with the grease, and not paying due attention to cleanliness, incautiously bears his part in milking the cows, with some particles of the infectious matter adhering to his fingers. When this is the case, it commonly happens that a disease is communicated to the cows, and from the cows to the dairy-maids, which spreads through the farm, until most of the cattle and domestics feel its unpleasant consequences. This disease has obtained the name of cow-pox. It appears on the nipples of the cows, in the form of irregular pustules. At their first appearance they are commonly of a palish blue, or rather of a color somewhat approaching to livid, and surmounted by an erysipelatous inflammation. These pustules, unless a timely remedy be applied, frequently degenerate into phagedenic ulcers. The animals become indisposed, and the secretion of milk is much lessened. Inflamed spots now begin to appear on different parts of the hands of the domestics employed in milking, and sometimes on the wrists, which quickly run on to suppuration, first assuming the appearance of small vesications, produced by a burn. Most commonly they appear about the joints of the fingers, and at their extremities; but whatever parts are affected, if the situation will admit, these superficial suppurations put on a circular form, with their edges more elevated than their centre, and of a color distantly approaching to blue. Absorption takes place, and tumors appear in each axilla. The system becomes affected—the pulse is quickened; and shiverings, with general lassitude and pains about the loins and limbs, with vomiting, come on. The head is painful, and the patient is now and then even affected with delirium. These symptoms, varying in their degree of violence generally, continue from one day to three or four, leaving ulcerated sores about the hands, which, from the sensibility of the parts, are very troublesome, and commonly heal slowly, frequently becoming phagedenic like those from whence they sprung.

"Thus the disease makes its progress from the horse to the nipple of the cow, and from the cow to the human subject."

Since no fatal effects have ever been known to arise from the cow-pox, even when impressed in the most unfavorable manner; and since this disease appears from numerous instances to leave the constitution in a state of perfect security from the infection of the small-pox, Dr. Jenner infers, that the employment of the matter of the cow-pox would be preferable to that of the small-pox, for the purpose of inoculation. In confirmation of his opinion, it may be observed, that he relates the cases of seven or eight persons whom he successfully inoculated with this new antidote to the variolous poison.

Possessed of the above information I confess I became very anxious to try the effect of inoculating the matter of this singular disease, and as trials could be made not only with safety, but also with the prospect of advantage, I conceived it to be a duty that I owed to the public in my official situation at the Inoculating Hospital to embrace the first opportunity of carrying the plan into execution.

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[*] See an inquiry into the causes and effects of the variolæ vaccinæ, a disease discovered in some of the western counties of England, particularly Gloucestershire and known by the name of the cow-pox.

[†] See an inquiry concerning the history of cow-pox.

Unfortunately, however, at the time Dr. Jenner's publication appeared, no cow-pox matter could be procured, for the disease had then become extinct; nor was it expected to return till the spring, the period at which it usually affected the cows. But conceiving that the distemper might be produced by inoculating the nipples of cows with the matter of grease of horses, in conformity with the opinion above stated I proceeded to try whether the cow-pox could be actually excited in this manner.

Numerous experiments were accordingly made upon different cows, with the matter of grease, taken in the various stages of that disease, but without producing the desired effect; my friend, Mr. Coleman, the ingenious professor at the Veterinary College, likewise made similar trials, which proved equally unsuccessful.[*] Neither were inoculations with this matter, nor with several other morbid secretions in the horse, productive of any effects upon the human subject.

I am aware, that the experiments I allude to, may, by some, not be deemed wholly conclusive from a supposition that the peculiar predisposition of the cows, necessary to render the inoculations efficient, might not exist at the time the matter was applied to their nipples.

But I have also other reasons for believing that the cow-pox does not originate from any disease of the horse. In the first place, the affirmative opinion is confessedly gratuitous. A horse, at a certain season of the year, becomes affected with the grease, and the cows at the same time are affected with cow-pox; and from this coincidence the two diseases have been considered as cause and effect. Yet is it not equally probable that the same temporary causes which produce a certain disorder in one animal may so operate upon another animal of a different genus as to excite another disorder? Therefore, though the cow-pox may break out among the cows at the time that the grease affects the horses kept on the same farm, yet the consecutive appearance of these diseases affords no proof of their connection; while, on the other hand, I can adduce instances in which the former disease has broken out under such circumstances as render it highly improbable, if not impossible, that it should have been caused by the latter.[†]

But, though Dr. Jenner seems to have been misled with respect to the origin of the cow-pox, still his facts and observations concerning its effects upon mankind are not the less valid and important; nor did I feel the less desirous to try how far they would be invalidated or confirmed by a more enlarged experience than he had the opportunity of acquiring.

Towards the latter end of January last I was informed that the cow-pox had appeared among several of the milch cows kept in Gray's Inn Lane, and upon examination of these, three or four were discovered to be affected with pustulous sores upon their teats and udders. These pustules corresponded in their appearance with the representation and description of the genuine cow-pox, as given by Dr. Jenner. I should not, however, call the surrounding inflammation erysipelatous; it was evidently an indurated tumefaction of the skin. The number of cows kept at this place was at this time about two hundred, and about four-fifths of them were eventually infected.[‡]

The hands of three or four persons became sore in consequence of milking the cows thus affected; and one of them, Sarah Rice, exhibited so perfect a specimen of the disease that I could entertain no doubt of its being the true, and not the spurious, cow-pox.

Several gentlemen who I knew would be highly gratified by seeing the disease as it appeared upon the girl's arm, were invited to meet me at the cow-house on the following day, when Lord Summerville, Sir Joseph Banks, Sir Wm. Watson, Drs. Simmons, Pearson, Willan, and others, attended. This was on the 24th of January last, and Sarah Rice had then been affected five days. The appearance of the disease upon the girl's hand and arm very much resembled the representation of it given in the first plate of Dr. Jenner's pamphlet At first a small tumor or circular vesication appeared between her fingers; next day she discovered three more like the first, namely, one upon her finger, another at the wrist, and also one upon the middle of her forearm. The two first never became larger, and exactly resembled the vesicle upon the finger in the plate alluded to; that at the wrist was now about one-third of an inch in diameter, and the other upon her arm was still larger; they were both of a circular form, not depressed at the centre, and had a simple inflammatory border; the pellicle of both these tumors, but more especially of the larger, had at this time acquired a blue color, which was deepest about the centre. This blueness had come on during the last twenty-four hours; for I had seen the tumors the preceding day, when this colored tinge could scarcely be perceived, and that too only in the largest; at that time also it contained a colorless fluid, but now its contents appeared brownish. The girl now perceived an uneasiness at the axilla; and I afterwards learned that this symptom was followed by a slight headache. None of the tumors were painful, and they all gradually went off without producing ulceration.

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[*] Mr. Coleman caused one of his cows to be inoculated in its teats with cow-pox matter and that taken from a variolous pustule, without effect: but the former matter, after being regenerated by the human subject, produced the disease in the cow.

[†] Those who wish for further information on this subject, may consult Mr. Simmons' Experiments and Dr. Pearson's Inquiry, pp. 83-84.

[‡] *Those cows which* were not in milk escaped the disease.

Sarah Rice had undergone the small-pox when a child; and the only reason why she was more affected by milking the diseased cows than the other milkers were, was that her hands and arms were more red, swollen, and disposed to chap than theirs; though it does not appear that there were any abrasions of the cuticle of those parts of the skin which were infected by the cow-pox.

Before relating the cases of inoculation with the matter of cow-pox, I have judged it proper in the first place briefly to state what are the local effects produced by inoculating variolous matter, so that the progress of the infection in both cases may be compared, and the subject of inoculation at large, be better understood.

In cases wherein inoculation of the small-pox proves effectual, a small particle of variolous matter being applied by a superficial puncture of the skin, usually produces in the course of three or four days, or sooner, a little elevation of the punctured part, discoverable by the touch, and a red speck distinguishable by the eye. From this time the redness advances in a circular form, more or less rapidly, according to the constitutional circumstances of the patient; and the first effect of this superficial inflammation is the formation of a vesicle upon its centre, which usually appears between the fourth and seventh day after the inoculation. The extent of the vesicle is generally found to bear some proportion to the intensity of the inflammation; and contains a limpid fluid, by the absorption of which the small-pox is produced. The vesicle soon bursts, and the central part of the puncture becomes depressed, and often of a dark hue; which appearances, together with the marginal inflammation, continue to increase till the eruptive symptoms subside, when the edges of the depressed part begin to swell with a purulent fluid, and the inflammation gradually recedes.

Thus it appears that the variolous matter, first inserted by the puncture, like that of other morbid poisons, is not capable of being immediately absorbed, but lodges in the skin, and there excites an inflammatory process, by which a new matter, producing the disease is generated*. It would seem also that this process is carried to a greater or less extent in different persons before the matter enters the absorbents, owing probably to the greater or less aptitude in these vessels to receive it; hence we find the local inflammation, in some cases, considerably advanced before the system becomes affected, while in others the eruptive symptoms supervene when it appears to have made but very little progress; and, therefore, though the eighth day after the inoculation, proves the usual period at which the patient feels indisposed, yet this frequently happens much sooner or later, and the progress of the cow-pox infection will be found to take the same latitude.

Monday, January 21, 1799, I took the matter of cow-pox in a purulent state upon the teats of a cow, with which I immediately inoculated seven persons by a single puncture in the arm of each, or rather by scratching the skin with the point of a lancet till the instrument became tinged with blood.

FIRST CASE.

Mary Payne, a child, two years and a-half old, of a strong, robust constitution. Third Day.—The inoculated part was evidently ulcerated and slightly inflamed. Sixth Day.—The local tumor extended to about one-third of an inch in diameter, and was nearly of a circular form, with its edges more elevated than the centre, and, with the surrounding inflammation, not greater than is usual in cases of inoculated small-pox. The vesicle, upon the middle of the tumor, was now very large, and distended with a limpid fluid, some of which I took upon a lancet and with it inoculated another person, John Talley. She appeared dull and drowsy, and her pulse was quicker than usual. She had no appetite for food, and had been very thirsty since yesterday. Eighth Day.—The redness surrounding the tumor seems returning; and the thirst and other febrile symptoms are much abated: but she still appears lifeless and somewhat indisposed. Eleventh Day.—She is perfectly free from complaint; the inoculated part is scabbing, but surrounded with a hard tumefaction of a bright red color. She was this day inoculated with variolous matter. Fifteenth Day.—She has no ailment. The variolous inoculation produced considerable inflammation, which gradually disappeared after the fifth day.

SECOND CASE.

Elizabeth Payne, aged four months, in appearance weak amd somewhat emaciated. The progress of the infection on this child's arm was very much like that of her sister's, just mentioned: but the vesication seemed rather more extensive, and the surrounding inflammation less. The sixth day after inoculation her mother informed me that the child had been very unwell the preceding night with what were called inward convulsions, and had vomited two or three times. On examination, the heat of her skin, and the frequency of her pulse, indicated the presence of some degree of fever. Eighth Day.—I learned that the febrile state had continued, more or less, till this morning; nor was it then wholly gone off, The inoculated part, I judged from its appearance, had not entirely ceased from disordering the constitution. Eleventh Day.—The redness of the tumor is subsiding, and its general appearance resembles the effects of inoculation with variolous matter when the eruption is completed, and the maturation proceeding favorably. The patient's mother now thinks her as well as usual. She was this day inoculated with variolous matter. Thirteenth Day.—She manifests no signs of indisposition. The redness about the tumor is gone off, and the matter is forming a scab. The second inoculation produces no effect. Fifteenth Day.—She is now very well; but her mother says she was seized with inward convulsions yesterday, and was extremely ill afterward for two hours; this, however, cannot be justly ascribed to inoculation, as the part in which the cow-pox matter was inserted is now covered with a dry scab, not attended with inflammation; and the variolous matter produced no redness whatever. She was this day brought to a man laboring under the casual small-pox, and kissed by him, in order more fully to try if she was secure from the infection of the small-pox. Her sister, Mary Payne, was also subjected to the same test, but neither of them have since taken the disease.

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*In the second volume of the History of Inoculation, now nearly ready for the press, I have endeavored to show that the general greater mildness of the inoculated than the casual small-pox depends upon this circumstance.

THIRD CASE.

Thomas Buckland, a strong child, four months old. The progress of the infection on the boy's arms was even more regular and produced appearances more analogous to those of the inoculated small-pox than in the case of Mary Payne. The vesicle on the inoculated part formed on the third day, and the surrounding inflammation never became phlegmonous, nor was it attended with any hardness of the integuments. Seventh day.—In the evening he was discovered to be feverish and restless, when two pustules exactly resembling those of the small-pox appeared near to the inoculated part. The following day he still continued indisposed, and the cutaneous inflammation had that peculiar irritable or angry aspect which is observed on the accession of the eruptive symptoms in cases of inflammation with variolous matter. Tenth day.—The suppuration was more extended, and the efflorescence immediately encompassing it, had nearly disappeared, leaving its border more strongly marked than the inner; a circumstance of the most favorable import in inoculation. The two pustules upon his arm were more advanced, and several others were visible upon different parts of his body, his ankles and feet were beset with a rash like scarlatina. He is still feverish, and his mother reports that last night he vomited Eleventh day.—The soreness of his arm, and the fever had ceased. Nine distinct pustules were now discovered upon his body and limbs, somewhat smaller than variolous pustules; from one of these I obtained an ichorous matter, and with it inoculated Sarah Price. Thirteenth day.—The febrile symptoms returned yesterday, nor is he wholly free from them to-day Nine additional pustules have appeared; no inflammation remains at the inoculated part, and the matter it contains begins to dry. Fifteenth day. He is free from disorder; six pustules have appeared making in the whole twenty-four, some of them maturate at the apex, but they mostly die away without proceeding to suppuration. He was this day exposed to the effluvia of casual small-pox, in the same manner as the two Paynes.

FOURTH CASE.

Richard Payne, a healthy boy, ten years old. The inoculated part was not sensibly elevated nor inflamed, till the fourth day. Seventh day.—The tumor had spread considerably; and the vesication upon it was very evident. He felt a sensation of itching in the part; and the next day complained of a pain in the axilla, which continued two days. Tenth day.—The centre of the tumor became depressed, its edges elevated, and surrounded by a deep-colored inflammatory border. The central part of the tumor was now assuming externally a brown color and in a few days afterwards it formed a dark scab. Though considerable tumefaction, with hardness and redness, remained at the inoculated part several days yet no ulceration ensued. Fifteenth day.—Five pustules remained resembling those in Buckland. This boy was twice inoculated with variolous matter during the progress of the cow-pox infection, and exposed to patients under the small-pox the whole time, without being infected by it; and the only complaint arising from the cow-pox was the pain in his arm-pit.

FIFTH CASE.

Matthew Redding, sixteen years old. Third day.—The insertion of the matter did not appear to have produced any inflammation or hardness in the part; he was, therefore, inoculated with variolous matter, at the distance of two inches from the part in which the cow-pox matter was inserted Next day a little redness could be discovered at the first puncture, and from this time both inoculations proceeded very regularly, but slowly, so that on the seventh day they appeared to be inflamed in an equal degree, the extent of the inflammation not exceeding the tenth of an inch in diameter. Eighth day.[*]—He has pain in the axilla. Tenth day.—Both tumors are approaching to suppuration. They are of the same form, and attended with an equal degree of efflorescence. Eleventh day.—He complains of headache; the red tinge now extends in a circular form, and includes both tumors. Thirteenth day.—There appears more tension and pain at the variolous tumor than at the other, but the latter tumor is more prominent. Fifteenth day. Both tumors began to dry, and no inconvenience followed. This boy made no other complaint, during the process of infection, than of uneasiness in the axilla, followed by a slight headache, of very short duration; however, on the seventeenth day, four small pustules appeared, viz: one upon his nose, one upon his thigh, and two on his head: none of which suppurated. This case strikingly resembles that of Richard Payne, on which the pustules did not appear till the arm scabbed.

SIXTH CASE.

Jane Collingridge, a healthy, active girl, seventeen years of age. Third day.—The inoculated part began to be elevated and inflamed. Fifth day—It was vesicated, and attended with itching. She was inoculated with variolous matter in the right arm, the former inoculation having been in the left. Eighth day.—The whole tumor is much increased in all dimensions; its form is perfectly circular, and it appears of a lemon-colored tint. She now complains of a stiffness across her arms, and of a pain in the axilla: the puncture in the right arm begins to be elevated and inflamed. Eleventh day.—She complains of headache and pains about the loins; the tumor produced by the cow pox matter is now more inflamed at the margin, which is beset with minute confluent pustules; the variolous tumor is also advanced to a state of vesication; and she reports, that last night both axillas were painful. Twelfth day.—She continues indisposed; the tumor is surrounded by an extensive efflorescence; the variolous tumor is of a deeper red color. Thirteenth day.—The cow-pox tumor is subsiding and forming a scab; that of the small-pox is efflorescent; her headache continues; pain in the right axilla; several pustules appear. Fifteenth day.—There are small pustules round the edges of the variolous tumor; more pustules appear scattered over the face, body, and limbs. Seventeenth day.—The scab over the cow-pox tumor is in a state of suppuration; she complains of a sore throat; the number of pustules is now from one to two hundred, in no respect differing from variolous pustules of the mild sort. From this time both the tumors gradually healed, and the pustules dried at the usual time.

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[*] Here as well as in the subsequent cases, where the patient was twice inoculated on different days, I date he time from the first inoculation.

SEVENTH CASE.

Ann Pink, a tall girl, of a brown sallow complexion, aged fifteen years. This girl was inoculated with variolous matter, on the fifth day, in the same manner as Collingridge, and both tumors proceeded to maturation, though more slowly than in that case Neither of the tumors began to scab till the seventeenth day, when they resembled each other so perfectly that the one could not easily be distinguished from the other. She had no pain in either axilla, nor made any complaint during the whole progress of the infection, neither did pustules appear upon her.

The only other persons whom I first inoculated with the matter of cow-pox, and on the fifth day afterwards with variolous matter, were William Harris, William Bunker and James Crouch.

EIGHTH CASE.

William Harris, twenty-one years of age, of a tall and slender make, and of a delicate constitution, was inoculated January 24 with the matter of cow-pox, taken from the arm of Sarah Rice, who received the disease by milking the cows. Third day.—The inoculated part was evidently elevated and inflamed. Fifth day.—It advanced to vesication, and a sensation of itching was perceived in the part; he was this day inoculated with variolous matter. Ninth day.—The tumor of the first inoculation presents prominent callous edges with but very little redness; its centre is depressed and contains a lymphatic fluid; he perceives a tenderness in the axilla; the variolous tumor is considerably inflamed and vesicated, and itches more than the other. Next day a pain was perceived in the axilla of the arm, in which the variolous matter was inserted, as well as in the other. Twelfth day.—Redness of the cow-pox tumor is going off; but that of the variolous still spreads with an irregular margin. Fourteenth day.—Several pustules appear. The cow-pox tumor is now dry at the centre, but its surrounding edges appear of a blueish tinge, and still abound with ichorous matter. The variolous tumor is much inflamed, and beset with confluent pustules at its edges: its centre is depressed and of a dark hue. Nineteenth day.—The cow-pox tumor has formed into a dry scab, with a finely polished surface, and of a mahogany brown color; the variolous tumor is in a purulent state, with an extensive inflammation at the margin; the pustules are about 300 in number, very large, and all in a state of maturation. From this time all the effects of inoculation went off gradually; he never complained of headache, nor of any febrile symptom during the whole progress of the disease.

NINTH CASE.

William Bunker, a strong, healthy boy, fifteen years of age, was inoculated in his left arm, on the same day, and with matter from the same person as Harris. Third day.—The inoculated part was elevated and reddened Fifth day.—The inflammation was much increased; he was now inoculated in his right arm with variolous matter. Eighth day.—The tumor upon his left arm is much elevated, aud the vesication considerable since the sixth day; he now complains of pain in the axilla and of headache. The pustule on the right arm advances very slowly. Tenth day.—The pain in the axilla and the headache continue. The tumor of the left arm begins to scab in the centre, and is surrounded with a red tinge of considerable extent. The tumor on the right arm now also presents a red tinge of a familiar appearance, but not of half the extent. The tumor on the right arm now also presents a red tinge of a similar appearance, but not of half the extent; its center is in a state of vesication, and its edges studded with small pustules; his headache is not entirely gone off. Twelfth day.—The red tinge surrounding the tumor on the left arm has disappeared, except a narrow ring at its outer border the tumor on the right arm is depressed at the centre, where it is also of a livid color; its edges are hard and inflamed; he now discovers two or three pustules upon his body. Seventeenth day.—The matter of both tumors is almost wholly formed into a dry incrustation; no more pustules have appeared; one upon his hip has maturated. Twentieth day —Both tumors are perfectly scabbed; that upon his left arm appears browner and smoother than the other.

TENTH CASE.

James Crouch, seven years old, inoculated on the same day as the last patient with matter taken from the same girl, and with variolous matter five days afterward. Fifth day.—The inoculated part was considerably elevated and inflamed. Ninth day.—The cow-pox tumor is much advanced; the pellicle filled with ichor; the marginal inflammation not considerable; the variolous puncture now displays a small red speck, which begins to spread. Eleventh day.—The cow-pox tumor exhibits an extensive efflorescence, or red stain, upon the surrounding skin, and its centre begins to dry; the variolous tumor is spreading a little, and in a state of vesication. Fourteenth day.—Pain in the axilla is now produced by the cow-pox tumor, which is drying at the centre; the variolous tumor is now efflorescent, but not to half the extent of the other. From this time the tumors quickly healed, no eruption took place, and no farther inconvenience was experienced.

ELEVENTH AND TWELFTH CASES.

Thomas Fox, aged twenty-five, and John Dennis, twenty-three years of age, both strong men, and accustomed to hard labor, were inoculated on the 22d of January with variolous matter, and on the following day with cow pox matter, taken from the arm of Sarah Rice. In both these cases, the first inoculation was performed by two punctures at the distance of two inches from each other, and the latter by one puncture at the same distance from the two former. The local effects and appearances of the inoculation were very similar in both these men; the cow-pox tumors seemed to advance equally with those of the variolous, and bore a strong resemblance to them; the former, however, were more elevated and circumscribed; for about the ninth day the variolous tumors became angulated or ragged at the margin, which was not so conspicuous as the others, though both had small confluent pustules at their margins. Those of the cow-pox also sooner healed, and formed a smoother scab. The eruptive fever came on about the eighth day with Dennis, but not till the tenth with Fox; the former had more than 300 pustules; and the latter about 100; all of which were in every respect similar to variolous pustules.

THIRTEENTH AND FOURTEENTH CASES.

John Talley, fourteen, and Thomas Brown, fifteen years old, were, January 25th, inoculated with variolous matter in the left arm, and the following day they were both inoculated in the right arm with the matter of cow-pox, taken from the arms of Mary and Elizabeth Payne, (see cases first and second). The progress of both the infections on the arms of these boys was perfectly regular and equal throughout. On the seventh day all the tumors were considerably inflamed and in a state of vesication, attended with itching. Brown also at this time complained of a pain in each axilla; but with Talley the pain was confined to the left till the next day, when both arm-pits were affected. Tenth day.—They both complained of headache and of pains about the loins; these, however, were very slight, and no further indisposition ensued. On the evening of the twelfth day some pustules appeared upon Brown, but upon Talley they did not appear till the fourteenth day; the former had in all about thirty, and the latter only six, all of which were apparently variolous. The cow-pox tumors were more elevated at the edges and less depressed at the centre after the ninth day than those of the variolous; and they eventually formed a smoother and browner scab, as in the case of Fox and Dennis.

January 30th.—William Mundy, Elizabeth George and Sarah Butcher were inoculated by two punctures with the matter of cow-pox, taken from the arm of Collingridge, (Case 6th.)

FIFTEENTH CASE.

William Mundy, a strong laboring man, aged twenty-five years, was inoculated as above described by two punctures in his left arm. The local infection of both punctures advanced, and the inflammation and its effects proceeded rapidly, so that on the eighth day he complained of uneasiness in his axilla, and of pain in the head and loins, which continued about two days; the tumors were considerably elevated, and their margins much inflamed. Thirteenth day.—They were surrounded with an extensive redness, in the form of an halo, and beginning to scab at the centre; the edges continued circular, well defined, and elevated. Fourteenth day. Several pustules appeared upon his neck and back but disappeared in two or three days without suppurating. He was this day inoculated with variolous matter, but it produced no other effect than a little redness of two or three days duration.

SIXTEENTH CASE.

Elizabeth George, a strong woman, twenty-five years old, was inoculated in the same manner, and on the same day above mentioned, with cow-pox matter taken from the same person. The punctures quickly rose, but the inflammation was inconsiderable till the sixth day, when vesication and itching commenced. Ninth day.—Has no pain in the axilla, but complains of headache and pain in the loins. Eleventh day.—Her pains continue; pulse quick; the central pellicle of the tumors is extending, and replete with a watery humor; the margins swollen and red. Thirteenth day.—The same appearances continue. Fifteenth day.—The symptoms are abated; says she has no other complaint than a giddiness of the head; the inflammation at the margin of the tumors is greatly abated; the matter in the centre is beginning to dry; some pustules appear on the face. Sixteenth day.—She makes no complaint; more pustules show themselves; the tumors appear circular, with the centre equally elevated as the edges, and exhibiting an uniform, smooth surface, which is becoming hard. Eighteenth day.—More pustules have appeared; the tumors are scabbing, and the surrounding redness is almost wholly gone. Twentieth day.—Her face is swelled; the pustules are very sore, and in a purulent state; their number is five hundred and thirty, and two in the throat are a little troublesome. Twenty-fifth day.—The pustules in a state of desquamation. She was now inocalated with variolous matter, which produced no effect. The scabs at the inoculated parts were of that brown, smooth kind peculiar to the cow-pox.

SEVENTEENTH CASE.

Sarah Butcher, a healthy girl, thirteen years old, was inoculated with the matter of cow-pox at the same time and in the same manner as above mentioned. Sixth day.—The tumors were much elevated, the inflammation inconsiderable; the vesication fully formed, and attended with itching. Ninth day.—There was a slight efflorescence around the tumors, uneasiness in the axilla, headache, pain in the loins. Eleventh day.—Suppuration at the inner edges of the tumor, redness at the outer edge very extensive. Fourteenth day.—Tumors scabbing; no eruption; complains of pain in her bowels and diarrhœa. Sixteenth day.—No complaint, central part of tumor scabbed; inflammation still surrounding the edges. She was inoculated this day with variolous matter. Eighteenth day.—The redness gone off, leaving a red tinge at its outer margin. The variolous matter produced a little redness, which disappeared in two days.

January 31st.—Thomas Wife, aged fourteen, and Sarah Price, aged thirteen years, were inoculated with the matter of cow-pox, taken from Mathew Redding, and at the same time with variolous matter, but the latter inoculations were the following day prevented by applying the concentrated acid of vitrol to the punctures.

EIGHTEENTH CASE.

Thomas Wife, above mentioned. Fifth day.—The inoculated part was considerably inflamed and vesicated. Eighth day.—The tumor advances with much marginal redness, and a pain in the axilla is perceived. Twelfth day.—Pain in the axilla continued two days. He has no other complaint. The centre of the tumor is forming a scab, but is surrounded with an appearance like areola papillæ. Two pustules were discovered upon his body this day, and two more appeared on the fifteenth day, but none of them became purulent. The tumor upon his arm had at the time formed a hard, smooth scab.

NINETEENTH CASE.

Sarah Price, inoculated, as above stated, in her left arm; on the same day was inserted in her right arm cow-pox matter, taken from a pustule from Buckland. Fifth day.—There was a redness of elevation at the two punctures of each arm, but in consequence of the caustic effects of the vitriolic acid none at the variolous puncture. Eighth day.—Both tumors were advanced; vesication and a considerable degree of inflammation, especially in that on the left arm. She now complains of *rigor* and of pain in the left axilla. These symptoms, together with a headache, continues two days. Three pustules have appeared upon her face and neck, and two days afterwards three others, none of which suppurated. This girl, as well as Thomas Wife, was constantly exposed to the small-pox during the progress of their inoculation.

TWENTIETH CASE.

Thomas Dorset, inoculated February 1st, with the matter of cow-pox, taken from the arm of Jane Collingridge (see case six). Seventh day.—The inoculated part was much elevated and in a state of vesication, attended with the usual degree of redness. Eleventh day.—Last night he perceived an uneasiness in his axilla, and he now complains of pain about his loins; the tumor encircled by an extensive efflorescence. Thirteenth day.—The tumor scabbing at the centre He was inoculated this day with variolous matter. The variolous inoculation, produced no effect. About the twelfth day this man had four or five pustular appearances which he called pock, but they seemed to me more like common pimples than variolous pustules.

TWENTY-FIRST CASE.

John Keys, twenty-five years old, inoculated February 6, with matter of cow-pox taken from the arm of James Crouch. On the fourth day the inoculated part was considerably inflamed, and affected with a sensation of itching; but from this time the redness gradually disappeared, and was entirely gone on the ninth day, when he was inoculated with variolous matter in both arms, but without effect. On the tenth day, however, he complained of pain in his head and loins, with which he was affected three days, but no eruption ensued.

TWENTY-SECOND CASE.

Edward Turner, a strong man, twenty-four years of age, inoculated by two punctures with the matter of cow pox taken from the arm of James Crouch (Case Tenth) February 5th. Seventh day.—The tumors were much advanced, in a state of open vesication, and attended with itching. Twelfth day —They began to dry in the centre, but the margins were of a dry red color, and studded with minute vesiculæ; he now complains of pain in the axilla, stiffness of his neck and pain in the loins. Fourteenth day.—Headache and pains in the loins continue; the inner edges of the tumors are distended with an ichorous fluid. Sixteenth day.—Complaints of headache and sore throat; next day about 100 pustules appeared, many of which were very small. Nineteenth day.—He has no complaint; the number of the pustules now amounts to about 220; all of them afterwards suppurated. On the twenty-third day he was inoculated with the variolous matter, which produced no effect.

TWENTY-THIRD CASE.

Hannah Morgan, a strong child, one year old, was inoculated with the matter of cow-pox taken from the arm of James Crouch, February 5. Fifth day.—The inoculated part is much elevated and inflamed. Seventh day —The tumor contains ichor, and the redness and elevation are greatly increased; yesterday she became feverish, and last night was sick and vomited; her skin at this time is hotter than usual. Fourteenth day —The febrile symptoms continued, and at times were very severe, till the tumor is now scabbing. She was afterwards inoculated with variolous matter, but it only produced a transient redness in the part.

TWENTY-FOURTH CASE.

Jane West, twenty-one years of age, was inoculated on February 6th with the matter of cow-pox, taken from the arm of Sarah Butcher. Seventh day.—The inoculated part was considerably elevated and inflamed; the vesication was also extensive and attended with itching. Ninth day.—She complained of headache, and next day of a pain in the axilla and upon her shoulder, attended with rigors and shivering; the border of the tumors appeared of a deep red, and its inner edges contained an ichorous matter. Thirteenth day.—Yesterday an efflorescense appeared around the tumor. She complains of a sore throat, and says she has a pain across her chest. Fifteenth day.—Two pustules have appeared upon her side; the tumor begins to dry. She makes no complaint. Seventeenth day —Twenty pustules appeared, all of which supparated. Twenty-third day.—The variolous inoculation produced no inflammation.

TWENTY-FIFTH CASE.

Ann Bumpus, aged twenty years, was inoculated February 6 with the matter of cow-pox, taken from the arm of Sarah Butcher. The appearances of the inoculated part in this girl's arm corresponded in every respect with those stated in West's case. Eighth day.—She complained of headache. Tenth day.—Pain of the head and loins; shivering. Eleventh day.—Two or three pustules appear upon her face. Thirteenth day.—Pains continue; more pustules appear. Fifteenth day.—No complaint; the pustules were counted and found to be 310, resembling those of the small-pox. Seventeenth day.—Complains of sore throat. Nineteenth day —Pustules drying. Twenty-second day.—Inoculated with the matter of small-pox, but no inflammation was produced by it.

TWENTY-SIXTH CASE.

Thomas Slade, twenty years of age, was inoculated with the matter of cow-pox taken from the arm of William Mundy, February 6. On the eighth day the inoculated part was much elevated and in an advanced state of vesication. He complained of headache and pain in the axilla; and on the next day of a pain in the loins. Eleventh day.—Pains abated; three or four pustules appear; the tumor is bordered with small surrounding vesicles. Fourteenth day.—No complaints; tumor beginning to scab. Nineteenth day.—The centre of the tumor formed a brown, hard scab. The pustules do not suppurate and are receding. Twenty-second day.—He was inoculated with the matter of small pox, which produced a redness for two or three days, and afterwards gradually disappeared.

TWENTY-SEVENTH CASE.

Frances Jewel, a healthy young woman, twenty years of age, who had undergone the small-pox by inoculation when a child, was inoculated with the matter of cow-pox taken from the arm of Sarah Butcher, February 5. The inoculated part advanced with a tumor equal in extent and duration to that in the case last mentioned; on the ninth day headache and pains of the loins came on, and continued two or three days. The tumor began to scab on the thirteenth day, but no pustules appeared. She was afterwards inoculated with variolous matter, and also with that of the cow-pox, neither of which produced any inflammation.

TWENTY-EIGHTH CASE.

Charlotte Fisk, four months old, was on February the 13th, inoculated with the matter of cow-pox, taken from the arm of Frances Jewel. In this child the local disease proceeded very regularly. She had became indisposed on the eighth day, and continued feverish for three or four days, when about forty pustules appeared; but the greatest part of these pustules did not proceed to suppuration. The mother of the child labored under the natural small-pox, and was covered with pustules in a purulent state at the time her child was inoculated; yet the infant was suckled by her during the whole course of the disease, and was frequently seen besmeared with variolous pus. Whence it would appear that the vaccine infection not only prevents but actually supersedes the casual small-pox.

TWENTY-NINTH CASE.

James Tarrent, nineteen years old, was, on the 16th day of February, inoculated with the matter of cow-pox, taken from a pustule upon Elizabeth George. In this case the inflammation at the inoculated part proceeded very rapidly, and was more extensive than usual on the sixth day; but from this time it began to recede, and was entirely gone on the tenth day, only a small dry scab at the puncture being left. He was now inoculated with variolous matter, which did not produce any inflammation whatever. I consider this man one of the few whose constitutions cannot be effected either by the virus of the cow-pox or the small-pox. It is true he complained of headache about the ninth day, but I should not be disposed to attribute this symptom to the inoculation.

THIRTIETH CASE.

William Hull, aged eleven years, was, on the 8th day of February, inoculated with the matter of cow pox taken from the arm of Sarah Butcher. Seventh day.—The tumor at the inoculated part is advanced in the usual manner, and he this day complains of headache. Tenth day.—His headache and pains in the loins continue, and several pustules now appear upon him. Twelfth day.—The pains are gone off and more pustules appeared. Fifteenth day.—The pustules amount to about 200. They vary much in size, and are proceeding to maturation. Eighteenth day. He was inoculated with variolous matter, which produced no effect.

THIRTY-FIRST AND THIRTY-SECOND CASES.

February 8th, Hannah Hull, aged thirteen years, and Sarah Hull, eight years old, were inoculated with the matter of cow-pox taken from Sarah Butcher. These two sisters had the disease rather more favorably than their brother William Hull, for the inoculated part was in both surrounded by an efflorescence on the eleventh day, and the number of pustules upon the third was not equal to that of their brother's, nor were the eruptive symptoms of half the duration of his. On the twentieth day they were inoculated for the small-pox, but no disease ensued.

THIRTY-THIRD CASE.

George Reed, aged fifteen years, was inoculated with the matter of cow-pox taken from the arm of T. Jessel, February 14th. The inoculated part tumified in the usual manner; he complained of headache on the eighth day, and this symptom continued with occasional intermissions till the 13th day. Some pustules began to appear about the 11th, and the eruption was completed on the fourteenth day. They were in number about seventy some of which were very small, but they all maturated in a favorable manner. He was aftewards inoculated with variolous matter, which formed a pustular appearance; but no disorder was produced. Frances Pedder, Amelia Hoole, George Hickland and Elizabeth Morton, were inoculated on February 13th and 14th with cox-pox matter taken from the arm of Sarah Price, who was inoculated from a pustule on Buckland (see case three).

THIRTY-FOURTH CASE.

Frances Pedder, a child, eleven months old. The inoculated part was gradually elevated and inflamed. Eigth day.—The eruptive symptons supervened and she continued feverish till the thirteenth day, when several pustules appeared. The tumor began to scab and the number of pustules then upon her was forty, all of which inoculated without becoming purulent. She was afterwards inoculated for the small-pox without effect.

THIRTY-FIFTH CASE.

Amelia Hoole, five months old, was inoculated as above described. The local tumor advanced in the usual manner. Seventh day. She became feverish, and several small pustules appeared at the border of the tumor. Tenth day.—She continued slightly indisposed since the last report, and nine pustules are now visible upon her body and extremities. Fourteenth day.—The pustules amount to 102 in number, and form yellowish scabs. Eighteenth day.—The inoculated part was perfectly healed; the pustules appeared in a state of desquamation. She was at this time inoculated with variolous matter, but without effect.

THIRTY-SIXTH CASE.

George Hickland, six months old, inoculated from the person above mentioned. The eruption symptoms in this child were less severe, and of shorter duration than in the last case. However the number of pustules which appeared amount to 300, but only about one-third of them suppurated. This patient also resisted the infection of the small-pox by inoculation.

THIRTY-SEVENTH CASE.

Elizabeth Morton, nine months old, was more severely disordered than any of the four children inoculated with the matter taken from Sarah Price. The fever continued with some degree of violence from the seventh to the fifteenth day, and the number of pustules amounted to 200. On the twentieth day she was inoculated with variolous matter without effect.

THIRTY-EIGHTH CASE.

L. Davy, aged eleven weeks, was on February 19th inoculated with the matter of cow-pox taken from the arm of Charlotte Fisk. This child had the disease very favorably. On the tenth day the tumor was surrounded by efflorescence, and her skin was a little hotter than usual during that day only. On the thirteenth day one pustule appeared near to the inoculated part, and two upon her forehead, which were all she had. She was afterwards inoculated for the small-pox without effect.

THIRTY-NINTH CASE.

Maria Murrell, aged four months, was inoculated with matter taken from the same person and on the same day as Davy. Fifth day.—The inoculated part was much elevated and inflamed. On the evening of the eighth day she vomited. Tenth day.—The tumor was surrounded by a very extensive efflorescence, and she became hot and restless. Twelfth day.—She seemed free from fever, and about twenty pustules appeared upon her. Fourteenth day.—The inflammation upon the arm was gone off, and the pustules seemed to be scabbing. The subsequent inoculation of the small-pox as upon the others, produced no effect upon this patient.

A cow kept by Professor Coleman, at the Veterinary College, was inoculated on its teat with the matter of cow-pox taken from the arm of James Crouch, which produced the disease in the cow (see case ten). A man-servant, by milking this cow, was also affected with an extensive tumor upon his thumb; this soon acquired a livid blue color, and was attended with a considerable degree of fever for several days, and with a rash upon his ankles and feet.

With the matter produced in the nipple of this cow were inoculated Martha Streeton, James Smith and George Meacock.

FORTIETH CASE.

Martha Streeton, aged twenty-two years, was on the 18th of February, inoculated with the matter above mentioned. The inoculated part tumified in the usual manner, and on the ninth day she complained of headache, and afterwards of a pain in the axilla. The headache and pain in the loins continued, but not with severity, for five or six days. Pustules began to appear on the twelfth, and the eruption was completed on the sixteenth day, when the number was about 300. During the maturation of the pustules, which in no respect differed from those of the small-pox, she complained of her throat being sore. On the nineteenth day this patient was perfectly well. She was afterwards inoculated for the small-pox without effect.

FORTY-FIRST AND FORTY-SECOND CASES.

James Smith, sixteen, and George Meacock, thirty years of age, were, on the 19th of February, inoculated with the same matter as that mentioned in the preceding case. The latter of these patients had the disease nearly in the same manner as Streeton; but in a greater degree, for Meacock's pustules were more numerous and the inoculated part did not exhibit a tumor so well defined and elevated as Streeton's did. Smith's case differed widely from both; his arm tumified rapidly, and an erythema or blush extended from the puncture several inches up his arm, and down to the elbow. The eruptive symptoms began on the seventh, and continued till the eleventh day. He had four or five pustules upon his face, and nearly a hundred upon his body and limbs, all of which matured favorably and the erysipelatous appearance of the inoculated part soon went off, though no application was employed for that purpose. Both the above patients were inoculated with variolous matter, which produced no effect upon Meacock, but in Smith it was followed by a cutaneous inflammation of several days continuance.

Samuel Fairbrother, fifteen years old, Richard Calloway, aged nineteen years, James Camplin, aged seventeen years, John Turner, eight months old, and Mary Welsh, three months old, were all, on the 21st and 22d of February, inoculated with the matter of cow-pox taken from the arm of Edward Turner (see case twenty-two).

FORTY-THIRD CASE.

Samuel Fairbrother began to be indisposed on the ninth day, and had repeatedly slight feverish paroxysms with pain in the axilla till the fourteenth day, when four small pustules appeared, after which no further complaint ensued.

FORTY-FOURTH CASE.

In Richard Calloway the inoculated part tumified in the usual manner, and on the ninth day he first complained of a pain in the axilla and headache, which continued till the twelfth day, an extensive bright red blush then surrounded the tumor, and no farther complaint ensued. At this time also some pustules appeared, but their number never exceeded twenty. He had been inoculated in the hand as well as in the arm, in order to discover if the appearance of the tumor in a part constantly exposed to the air would be the same as in the arm covered by his dress. The difference was very evident, for the tumor upon his hand was much more extensive, of a more livid color, and attended with more inflammation than the other.

FORTY-FIFTH CASE.

James Camplin suffered rather more from the eruptive complaints than Calloway, and they continued with him a day longer. However, the disease gave him very little uneasiness, and he had only thirty pustules.

FORTY-SIXTH CASE.

John Turner's arm was inflamed very extensively, and he became feverish on the eighth day. The following day many pustules appeared, and on the eleventh day he was almost covered with pustules, having about 1000. These, however, were perfectly distinct, and they all maturated favorably, so that about the seventeenth day he was completely well.

FORTY-SEVENTH AND FORTY-EIGHTH CASES.

Joanna Buckley and Mary Welch had the disease in its mildest form. On the eighth day an efflorescence surrounded the inoculated part in both these children, and during this day only appeared a little indisposed. No pustules upon either of them

All the six patients thus infected with vaccine disease from E. Turner, were subsequently inoculated with variolous matter, which did not produce any disorder.

February 18th, William Walker, eleven months old; February 24th, Sarah Dixon, nineteen years old; Thomas Ellistone, aged fifteen months; Maria Dunn, aged twenty months; and James Cummins, aged fourteen weeks, were all inoculated with the matter of cow-pox taken from the arm of Hannah Bumpus.

FORTY-NINTH CASE.

*William Walker's arm tumified in the usual manner, but he did not manifest the least indisposition during the course of the infection; neither did any pustules appear, except one or two at the inoculated part.

FIFTIETH CASE.

Sarah Dixon's arm tumified in the usual manner, and on the tenth day she began to complain of a pain in her head and loins: this was followed by shiverings and a pain in the axilla and across her shoulders. Thirteenth day.—The pains were much abated, and some pustules appeared. Sixteenth day.—She makes no complaint, but of a soreness of her throat; the eruption is now completed, and the number of the pustules is found to be 174; all of these afterwards maturated.

FIFTY-FIRST CASE.

Thomas Ellistone was feverish from the sixth to the eighth day, when the tumor was surrounded with an extensive efflorescence. After this time he had no ailment. No pustules appeared.

FIFTY-SECOND CASE.

Maria Dunn was hot and restless from the sixth till the ninth day. She had no eruption.

FIFTY-THIRD CASE.

James Cummins did not seem the least disordered from the inoculation, although the inoculated part tumified very considerably, and several pustules appeared at the margin of the tumor on the eleventh day.

All the above-mentioned persons, inoculated with the matter of the cow-pox, taken from the arm of Bumpus, have been since inoculated with variolous matter, but without effect.

John Giles, twenty years of age; Wm. Bigg, eighteen years old; Wm. Briaris, fifteen years old; Sophia Dobinson, five years old; Sarah Dobinson, three years old; and Hannah Dobinson, one year old; were inoculated with the matter of cow-pox, taken from the arm of Jane West, February 21.

FIFTY-FOURTH CASE.

John Giles complained of headache from the ninth to the eleventh day. A slight soreness of the throat came on, and continued several days. He had about thirty pustules.

FIFTY-FIFTH CASE.

William Bigg also complained of headache and sore throat several days, and had about twelve pustules.

FIFTY-SIXTH CASE.

Wm. Briaris first complained of indisposition on the seventh, and continued somewhat disordered till the eleventh day. Only two pustules appeared.

FIFTY-SEVENTH CASE.

Sophia Dobinson's arm tumified extensively, but she made no complaint during the whole progress of the infection, and had no eruptions.

FIFTY-EIGHTH CASE.

Sarah Dobinson's case was in every respect similar to that of her sister Sophia.

FIFTY-NINTH CASE.

Hannah Dobinson suffered as little from the disease as either of her sisters till the fourteenth day, when, according to her mother's report, she was seized with convulsions for two or three hours. She had no eruption.

The above six patients have since been inoculated for the small-pox without effect.

Mary Greeville, twenty years old; Edward Honeywood, two years old; Thomas Rood, one and a half years old, Charlotte, Mile fifteen months old; Henry Barber, eleven months old; John Jenkins, one month old; Thomas Dix, eleven months old; Ann Walker, ten months old; Samuel Francis Prough, ten months old; Alexander Towser, eight months old; Wm. Knighton, eight months old; Sarah Price, eight months old; Elizabeth Spilsbury, four months old; Elizabeth May, four months old; Mary Ann Sully, three months old; Francis Terry, two months old; Wm. Scott, two months old; Wm. Johnson, two months old, were inoculated with the matter of cow-pox, taken from the arm of Martha Streeton, on February 25th.

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* The father of this child is an ingenious engraver in Rosamond street, Clerkenwell, who having lost a child under the effects of inoculated small-pox, was induced to inoculate his only son for the cow-pox. The particulars of the case are related by Mr. Walker himself, in the Medical and Physical Journal for *March*, 1799.

SIXTIETH CASE.

Mary Greenville, on the ninth day, began to complain of headache, which continued till the twelfth day when a sore throat came on, and gave her a little uneasiness for about two days. She had thirty-five pustules.

SIXTY-FIRST CASE.

Edward Honeywood was not perceptibly disordered from the inoculation, although his arm was much tumified; and on the eleventh day it exhibited an efflorescence. No eruption appeared.

SIXTY-SECOND CASE.

Thomas Rood was feverish from the seventh till the tenth day, and at the commencement of the fever he had two or three short convulsive paroxysms; but no eruption took place.

SIXTY-THIRD CASE.

Charlotte Mile. A little redness was observed at the inoculated part on this child's arm for two or three days; but this had wholly disappeared on the seventh day, when she was inoculated with variolous matter, which produced the disease in a favorable manner.

SIXTY-FOURTH CASE.

John Jenkins became indisposed on the twelfth day, and was very restless for three days. He had about 300 pustules.

SIXTY-SIXTH CASE.

Henry Barber had a slight fever on the eighth day, when symptoms of dentition supervened, but the fever was of short duration. He had but one pustule and that was upon his upper lip.

SIXTY-FIFTH CASE.

Thomas Dix's arm exhibited an extensive efflorescence on the eleventh day, and some evanescent pustules appeared; but he never manifested any indisposition during the progress of the infection.

SIXTY-SEVENTH CASE.

Ann Walker became indisposed on the ninth day, and continued fretful about twenty-four or thirty hours; the fever then ceased, and she has since been wholly free from disorder. No eruption appeared.

SIXTY-EIGHTH CASE.

Samuel Francis Brough was taken ill on the ninth with spasmodic paroxysms, succeeded by fever; the former were of short duration, but the latter, with occasional intermissions, continued for three days. Eleventh day—Some pustules appeared; their number, however, when the eruption was completed, did not exceed twenty.

SIXTY-NINTH CASE.

Alexander Towser was restless and feverish about two days. Ten pustules appeared.

SEVENTIETH CASE.

William Knighton had no eruption. He was a little indisposed between the seventh and tenth days.

SEVENTY-FIRST CASE.

Sarah Price had some indisposition on the ninth day, which terminated in a diarrhœa. On the thirteenth day she was perfectly well: two pustules were now discovered upon her right foot, which were all she had.

SEVENTY-SECOND CASE.

Elizabeth Spisbury was somewhat indisposed on the tenth, and on the fifteenth day; but the latter indisposition was the effect of teething. She had no eruption.

SEVENTY-THIRD CASE.

Elizabeth May was a little feverish on the eighth day, and continued somewhat restless till the thirteenth day; five pustules appeared.

SEVENTY-FOURTH CASE.

Mary Ann Sully was feverish on the ninth day, and passed a restless night, but on the next morning she was better; she made no further complaint, and no pustules appeared.

SEVENTY-FIFTH CASE.

Francis Terry, became feverish on the ninth day; the next morning a rash appeared, when he seemed to be as well as usual. He had only one pustule.

SEVENTY-SIXTH CASE.

William Scott was a little feverish on the eighth day only; no eruption ensued.

SEVENTY-SEVENTH CASE.

William Johnson's arm tumified in the usual manner. He had no pustules, nor did he appear feverish during the course of the disease; but on the evening of the thirteenth day, he was thought to be a little restless.

SEVENTY-EIGHTH CASE.

Mary Stewart, like Johnson, was not perceptibly indisposed during the whole progress of the infection neither had she any pustules.

The above patients inoculated with the matter taken from Streeton, were subsequently inoculated for the small-pox, without affecting any but Charlotte Mile, in whom the inoculation for cow-pox took no effect.

February 27th, Joseph Wrench, 24 years old; Stephen Peters, 19 years old; Peter Peters, 18 years old; Elizabeth Brown, 5 years old; Mary Shipley, 3 years old; Margaret Crosby, 10 months old, and John Evans, 7 months old, were inoculated with the matter of cow-pox, taken from the arm of James Smith.

SEVENTY-NINTH CASE.

Joseph Wrench continued indisposed from the tenth till the thirteenth day. An efflorescence appeared at the inoculated part on the eleventh day. Fifteenth day.—Several pustules appeared, and he now complained of a sore throat, which continued three days. The number of pustules was thirty.

EIGHTIETH CASE.

Stephen Peters began to complain on the eighth day, and continued to be affected with the usual febrile symptoms till the thirteenth day. He had only one pustule.

EIGHTY-FIRST CASE.

Peter Peters' complaints were similar to those in the preceding case. The efflorescence did not appear, till the eleventh day. He had twenty-four pustules, all of which were very small.

EIGHTY-SECOND CASE.

Elizabeth Brown's tumor on the eighth day was surrounded by an efflorescence. She made no complaint. nor had she any eruption.

EIGHTY-THIRD CASE.

Mary Shipley's arm exhibited an efflorescence on the eighth day; but was not perceptibly indisposed, and had only one pustule.

EIGHTY-FOURTH CASE.

Margaret Crosby had no eruption, nor was she perceptibly ill during the progress of her inoculation. Her arm, however, tumified in the usual manner, and displayed an efflorescence.

EIGHTY-FIFTH CASE.

On John Evan's arm there was an efflorescence on the sixth day, and the following day a slight fever commenced with a spasmodic paroxysm, but he was perfectly well on the ninth, and no eruption took place.

The above five persons have been since inoculated with variolous matter without effect.

Sarah Hat, twenty years old; and Elizabeth Platford, seventeen years old, were inoculated with matter of the cow-pox taken from the arm of Maria Murrell.

EIGHTY-SIXTH CASE.

Sarah Hat began to complain on the sixth day, and she continued much indisposed till the eleventh day, when the tumor was surrounded by an efflorescence, and she made no further complaint. The number of the pustules which appeared was about forty.

EIGHTY-SEVENTH CASE.

Elizabeth Platford was taken ill on the ninth day, when she complained of pain in the head and loins, with chilliness, etc.; the inoculated part at this time was considerably inflamed; the tumor was circular, but flat, and not surrounded by any efflorescence. Eleventh day.—The pains and shiverings continue; pulse very frequent and weak; tongue white. Thirteenth day.—The symptoms still continue; she also complains of pain across the shoulders; some pustules appear. Fifteenth day.—She complains of pain in the loins and of giddiness; the number of the pustules is much increased. Seventeenth day.—The pains continue; she is very weak and faint; her eyes and throat are inflamed and painful; the edges of the tumor are beset with confluent pustules; the pustules upon her face are about 200 or 300, and approach to confluency. Nineteenth day.—Her face is considerably swelled, and the pustules are now maturating rapidly; she makes no complaint, but of the soreness occasioned by the eruption. Twenty-first day.—Swelling of the face much subsided; the pustules in a state of desication Twenty-third day.—She continues recovering. Twenty-sixth day.—She complains of a sore throat, and a cough is troublesome to her. Twenty-eighth day.—The sore throat is almost gone, but the cough continues; pulse 100. Thirtieth day.—The cough is still violent. Thirty-second day.—The cough is abated, and her appetite improves; from this time she gradually recovered.

Both the above patients were afterwards inoculated with variolous matter, which produced no effect.

Isaac Cowling, twenty-three years old; Mary Webb, twelve years old; Sophia Mason, two years and half old; and Elizabeth Goodluck, three months old, were, on the 2d of March, inoculated for the cow-pox with matter from the arm of G. Reed.

EIGHTY-EIGHTH CASE.

Isaac Cowling sickened on the ninth, and the eruptive complaints did not wholly go off till the fourteenth day. He had about fifty pustules.

EIGHTY-NINTH CASE.

Mary Webb began to complain on the seventh day, and continued feverish for a week. On the tenth day a redness was diffused over the greatest part of her arm, between the elbow and shoulder, and did not wholly disappear till the fourteenth day. She had about twelve pustules.

NINETIETH CASE.

Sophia Mason's arm tumified in the usual way, and exhibited an efflorescence on the tenth day. She had four or five small evanescent pustules, but did not seem indisposed during the course of the infection.

NINETY-FIRST CASE.

Elizabeth Goodluck was taken ill on the eighth day, when she had a slight spasmodic fit; the tumor at this time exhibited an efflorescence. Eleventh day.—Has had no indisposition since yesterday. No eruption took place.

None of the above three patients took the small-pox in consequence of inoculation with variolous matter.

NINETY-SECOND AND NINETY-THIRD CASES.

March 3.—C. S. Cooke, four years old; and A. T. Cooke, two years old; were inoculated with the matter of cow-pox, taken from the arm of George Meacock.

An efflorescence at the inoculated part took place in both these children on the tenth day, but neither of them seemed indisposed from the inoculation, nor did any pustules appear upon them. They were also put to the test of inoculation with variolous matter, but no disease ensued.

March 3.—A. K. Gunter, one year old; Matthew Sears, nine months old; and Eliz. Giles, nine months old, were inoculated with the matter of cow-pox, taken from the arm of H. Dobinson.

NINETY-FOURTH CASE.

A. K. Gunter was a little feverish for two days. On the tenth day the tumor was surrounded by an efflorescence, which became very extensive. Only two or three imperfect pustules appeared.

NINETY-FIFTH CASE.

Matthew Sears was indisposed for about four or five days. The tumor was small and angular, nor was it ever surrounded with an efflorescence. He had about 200 pustules.

NINETY-SIXTH CASE.

Elizabeth Giles became indisposed on the tenth day. The tumor had a dark red colored border without any efflorescence. She had from 70 to 100 pustules

The above patients have been inoculated with variolous matter without effect.

Richard Scott, two years and a half old; Sarah Bennett, one year old; Maria Black, one year old; Mary Jenkins, nine months old; John Lawyer, eight months old; Eliz King, six months old; William Jones, six months old; Esther Phipps, six months old; and Ann Harper, five months old, were inoculated with the matter of cow-pox, taken from the arm of Elizabeth Brown.

NINETY-SEVENTH CASE.

Richard Scott became feverish for a short time on the tenth day. He had about fourteen pustules.

NINETY-EIGHTH CASE.

Elizabeth King's tumor, on the ninth day, was surrounded with an efflorescence. She did not manifest any indisposition, nor had any eruption,

NINETY-NINTH, ONE HUNDREDTH AND ONE HUNDRED AND FIRST CASES.

The cases of John Lawyer, William Jones and Sarah Bennett were similar to that of King.

ONE HUNDRED AND SECOND CASE.

Esther Phipps was a little restless and feverish from the tenth till the thirteenth day, but had no eruption.

ONE HUNDRED AND THIRD CASE.

Maria Black became feverish on the ninth day, and was indisposed for two or three days, during which time she had two slight convulsions. Some pustules appeared, but did not suppurate.

ONE HUNDRED AND FOURTH CASE.

Mary Jenkins was a little indisposed on the tenth day. She had no eruption

ONE HUNDRED AND FIFTH CASE.

Ann Harper was a little restless during the seventh and eighth night, but no eruption took place.

ONE HUNDRED AND SIXTH CASE.

Thomas Newman was feverish from the seventh till the twelfth day; but no pustules appeared

March 4th, George Paul, 3 years old; Ann Paul, 1 year old; Martha Chandler, 5 months old; Martha Hat, 1 year old; Eliz. Boardore, 7 months old; Samuel Lampart, 2 years old; Ann Page, one year and a half old; Jane Carter, 5 weeks old; William New, 18 months old; Susan Sermon, 6 months old; Alice Marshall, 2 years old; Harriat Marshall, 4 months old, and Frances Henley, 5 years old, were inoculated with the matter of cow-pox, taken from the arm of Elizabeth May.

ONE HUNDRED AND SEVENTH CASE.

George Paul was not perceptibly indisposed from the inoculation. He had two pustules.

ONE HUNDRED AND EIGHTH CASE.

Ann Paul was feverish for about three days, and had forty pustules, all of which were much smaller than those of the small-pox.

ONE HUNDRED AND NINTH CASE.

Martha Chandler's inoculation produced a very extensive efflorescence; but neither fever nor eruption ensued.

ONE HUNDRED AND TENTH CASE.

Martha Hat did not become indisposed till the thirteenth day, when a few small pustules appeared.

ONE HUNDRED AND ELEVENTH CASE.

Elizabeth Boardore's arm tumified considerably; but neither efflorescence, fever, nor eruption, took place.

ONE HUNDRED AND TWELFTH CASE.

Samuel Lampart was somewhat disordered from the ninth till the twelfth day, and had three small imperfect pustules.

ONE HUNDRED AND THIRTEETH CASE.

Ann Page was not sensibly indisposed from the inoculation, neither had she any eruption. The tumor was surrounded with an efflorescence on the twelfth day.

ONE HUNDRED AND FOURTEENTH CASE.

Jane Carter was slightly indisposed from the seventh till the tenth day, and had two or three pustules

ONE HUNDRED AND FIFTEENTH CASE.

William New was ill four days, and had about 100 pustules.

ONE HUNDRED AND SIXTEETH CASE.

Susan Sermon was taken ill on the ninth day, when she vomited. She continued feverish till the twelfth day. Only five pustules appeared.

ONE HUNDRED AND SEVENTEENTH, ONE HUNDRED AND EIGHTEENTH AND ONE HUNDRED AND NINETEETH CASES.

Alice Marshall, Frances Henley, and Harriet Marshall had no eruption, nor appeared to have any disorder from the inoculation. The local disease, however, was considerable in all these patients, and was attended with an efflorescence.

All the above patients who received the infection from Brown and May, have since been inoculated for the small-pox without effect.

ONE HUNDRED AND TWENTIETH CASE.

Mary Crouch, aged three years, was inoculated with matter taken from one of the pustules upon John Turner (see case forty-sixth). A tumor formed at the inoculated part in the usual manner, which was surrounded with an efflorescence; but neither fever nor eruption took place.

ONE HUNDRED AND TWENTY-FIRST AND ONE HUNDRED TWENTY-SECOND CASES.

Elizabeth Wood, aged three years, and Wm. Clifford, two years and a half old, were inoculated with cow-pox matter, taken from the arm of Mary Stewart, March 4th. Both these children were slightly indisposed about the tenth day, but neither of them had any pustules.

March 6 —The following persons were inoculated with the matter of cow-pox, taken from the arm of Ann Walker:

Amelia Restieux, 4 months old; John Bates, 6 weeks old; Martha Thompson, 2 years old; William London, 6 months old; Frances Wallace, 3 years old; Joseph Rogers, 42 years old; Thomas Thoroughgood, 14 years old; and Ann Thoroughgood, 17 years old.

ONE HUNDRED AND TWENTY-THIRD AND ONE HUNDRED AND TWENTY-FOURTH CASES.

Amelia Restieux and John Bates neither experienced any disorder from the inoculation, nor had any eruption; but both their arms tumified in the usual manner.

ONE HUNDRED AND TWENTY-FIFTH CASE.

Martha Thompson was feverish from the eight till the tenth day. She had only one pustule.

ONE HUNDRED AND TWENTY-SIXTH CASE.

William London was taken ill on the tenth day; and vomited; but the following day was as well as usual. He had no eruption.

ONE HUNDRED AND TWENTY-SEVENTH CASE.

James London had no perceptible disorder; and no pustules appeared. On the tenth day the tumor was surrounded with an efflorescence.

ONE HUNDRED AND TWENTY-EIGHTH CASE.

Frances Wallace was feverish for two or three days, but no eruption ensued.

ONE HUNDERD AND TWENTY-NINTH CASE.

Joseph Rogers on the eighth day complained of pain in the axilla, and was affected with headache for two or three days; but he had no eruption.

ONE HUNDRED AND THIRTIETH CASE.

Thomas Thoroughgood made the same complaints as Rogers. He had thirty-three pustules.

ONE HUNDRED AND THIRTY-FIRST CASE.

Ann Thoroughgood was indisposed for six or seven days, but she had only ten pustules.

The preceding twelve patients have had variolous matter inserted in their arm without effect.

The following persons were inoculated with the matter taken from the pustules of Martha Streeton, viz: Susan Reeve, 18 months old; Ann Reeve, 5 weeks old; Susan Richardson, 13 years old, and Mary Adams, 6 months old.

ONE HUNDRED AND THIRTY-SECOND AND ONE HUNDRED AND THIRTY-THIRD CASES.

Susan Reeve and Ann Reeve were very little disordered by the inoculation; the former, however, had twenty and the latter twelve pustules.

ONE HUNDRED AND THIRTY-FOURTH CASE.

Susan Richardson continued indisposed from the tenth till the fourteenth day, but she had only twelve pustules.

ONE HUNDRED AND THIRTY-FIFTH CASE.

Mary Adams had about two hundred pustules; but the eruptive symptoms were not severe. The tumor in this case spread, and formed an irregular margin, which was studded with confluent pustules.

March 7.—The disease was transferred from the pustules upon Sarah Dixon to the following children, viz: Caroline Harriskind, 4 years old; Wm. Harriskind, 2 years old; Daniel Harding, 14 weeks old; Elizabeth Harding, 3 years old; James Waters, 12 years old, and Joseph Harding, 17 years old.

ONE HUNDRED AND THIRTY-SIXTH AND ONE HUNDRED AND THIRTY-SEVENTH CASES.

Caroline and Wm. Harriskind were feverish for two or three days. The former had 100, and the latter had twelve pustules.

OND HUNDRED AND THIRTY-EIGHTH AND ONE HUNDRED AND THIRTY-NINTH CASES.

Daniel and Elizabeth Harding were but very slightly indisposed from the inoculation. Daniel had fifteen very small pustules: Elizabeth had only two.

ONE HUNDRED AND FORTIETH CASE.

James Waters complained of headache, pains of his limbs and sore throat, from the eighth till the fourteenth day. The tumor at the inoculated part was never much elevated above the skin, and had an angulated border. He had 120 pustules.

ONE HUNDRED AND FORTY-FIRST CASE.

Joseph Harding was very slightly disordered, and had no pustules.

March 8.—William Shipton, 4 years old; George Staits, 2 years old; Elizabeth Youngman, 3 months old; Mary Dudley, 2 years old; William Cade, 10 months old, and William Piper, 4 months old, were inoculated with the matter of cow-pox, taken from the arm of Esther Phipps.

ONE HUNDRED AND FORTY-SECOND, ONE HUNDRED AND FORTY-THIRD, ONE HUNDRED AND FORTY-FOURTH AND ONE HUNDRED AND FORTY-FIFTH CASES.

William Shipton, Elizabeth Youngman, William Cade and William Piper, had no pustules: and none of them appeared to be disordered from the inoculation, except Piper, who was a little feverish on the eighth day. An efflorescence took place around the tumor in all of them.

ONE HUNDRED AND FORTY-SIXTH CASE.

George Staits was indisposed for two days, and had three or four small pustular eruptions.

ONE HUNDRED AND FORTY-SEVENTH CASE.

Mary Dudley was a little feverish on the ninth day, when a rash appeared which receded the following day, and about fifty small pustules were discovered; these, however, disappeared in the course of twenty-four hours.

March 11.—Hannah Timms, 19 years old; Susan Timms, 17 years old; Jane Franklin, 12 years old, and Henry Lee, 15 years old, were inoculated with the matter of cow-pox, taken from the arm of Mary Webb.

ONE HUNDRED AND FORTY-EIGHTH CASE.

Hannah Timms was affected with the febrile symptoms from the eighth till the sixteenth day, and had 165 pustules, all of which suppurated.

ONE HUNDRED AND FORTY-NINTH CASE.

Sarah Timms was ill from the ninth till the fourteenth day. She had no eruption.

ONE HUNDRED AND FIFTIETH CASE.

Jane Franklin was very little indisposed from the inoculation, and had no eruption.

ONE HUNDRED AND FIFTY-FIRST CASE.

Henry Lee complained for two or three days, and had only one pustule.

March 13—The following persons were inoculated with the matter of cow-pox, taken from the arm of Sarah Hat, viz.: Ann Spooner, twenty-one years old; Matthew Wall, fourteen years old; John Wall, ten years old; William Ockendon, twelve years old; Joseph Ockendon, ten years old; Willirm Jennings, seven years old; George Jennings, six years old; John Pluckrose, seven years old; Charlstte Webb, fourteen weeks old; Charles Dibden, three months old; Elizabeth Eaton, two years old; Charlotte Eaton, ten months old; and Joseph Pigg, eleven years old.

ONE HUNDRED AND FIFTY-SECOND CASE.

Ann Spooner was indisposed for three or four days and had 150 pustules.

ONE HUNDRED AND FIFTY-THIRD CASE.

Matthew Wall was a little indisposed for three days. He had ten pustules.

ONE HUNDRED AND FIFTY-FOURTH CASE.

John Wall made no complaint, and had no eruption.

ONE HUNDRED AND FIFTY-FIFTH CASE.

William Ockendon was indisposed from the eighth till the tenth day. He had only one pustule.

ONE HUNDRED AND FIFTY-SIXTH CASE.

Joseph Ockendon was ill for three days. He had no eruption.

ONE HUNDRED AND FIFTY-SEVENTH CASE.

William Jennings complained of headache two days. He had only one pustule.

ONE HUNDRED AND FIFTY-EIGHTH CASE.

George Jennings was disordered in the same manner as his brother William, but he had no eruption.

ONE HUNDRED AND FIFTY-NINTH CASE.

John Pluckrose made no complaint and had no eruption.

ONE HUNDRED AND SIXTIETH AND ONE HUNDRED SIXTY-FIRST CASES.

Charlotte Webb and Charles Dibden.—The former was perceptibly disordered by the inoculation, and had no pustules. The latter was a little feverish on the ninth day and vomited. He had three pustules at the inoculated part only.

ONE HUNDRED AND SIXTY-SECOND AND ONE HUNDRED AND SIXTY-THIRD CASES.

Elizabeth Eaton and Charles Eaton were both slightly indisposed oh the eleventh and twelfth day, and each had about twenty pustules.

ONE HUNDRED AND SIXTY-FOURTH CASE.

Joseph Pigg complained of a pain in the axilla, and of a slight headache for four days. He had fourteen pustules only.

March 13.—The following were inoculated with the matter of cow-pox, taken from the arm of Samuel Lampart, viz.: Mary Ockendon, sixteen years old; Sarah Ockendon, seven years old; Sarah Stacey, twelve years old: Ann Stacey, seven years old; Mary Fuller, eleven years old; Isabella Barrett, eleven years old; Mary Perry, three years old; Susan Vinicum, five months old; Elizabeth Rensden, eighteen months old; Mary Ward, ten months old; William Terry, two months old; Caroline Poorey, three years old; Ann Poorey, eleven months old; John Langstaff, four years and a half old; Emma Lightfoot, thirteen months old; Daniel Sinclair, seven months old; M. H. Hills, eighteen weeks old; and Catharine Donaldson, nineteen months old.

ONE HUNDRED AND SIXTY-FIFTH CASE.

Mary Ockendon was indisposed from the ninth till the fourteenth day. She had only six pustules.

ONE HUNDRED AND SIXTY-SIXTH CASE.

Sarah Ockendon complained of headache, pain of her limbs, etc., from the tenth till the fourteenth day· but only four pustules appeared.

ONE HUNDRED AND SIXTY-SEVENTH CASE.

Sarah Stacey was indisposed from the tenth till the fifteenth day. No pustules appeared.

ONE HUNDRED AND SIIXTY-EIGHTH CASE.

Ann Stacey's case was similar to that of her sister Sarah.

ONE HUNDRED AND SIXTY-NINTH AND ONE HUNDRED AND SEVENTIETH CASES.

Mary Fuller and Isabella Barrett, both complained of the febrile symptoms from the ninth till the fourteenth day. The former had six, and the latter twenty pustules.

ONE HUNDRED AND SEVENTY-FIRST, ONE HUNDRED AND SEVENTY-SECOND AND ONE HUNDRED AND SEVENTY-THIRD CASES.

Mary Perry, Susan Vinicum and Elizabeth Brensden did not appear to be indisposed from the inoculation, and had no eruption; but the tumors in all were considerable, and surrounded by an efflorescence.

ONE HUNDRED AND SEVENTY-FOURTH CASE.

Mary Ward was a little feverish for two days, and a few small pustules appeared for one day only.

ONE HUNDRED AND SEVENTY-FIFTH, ONE HUNDRED AND SEVENTY-SIXTH, ONE HUNDRED AND SEVENTY-SEVENTH AND ONE HUNDRED AND SEVENTY-EIGHTH CASES.

William Terry, Ann Poorey, Caroline Poorey and John Langstaff had no pustules, neither did any of them appear to be indisposed, except Ann Poorey, who was feverish for two days.

ONE HUNDRED AND SEVENTY-NINTH AND ONE HUNDRED EIGHTIETH CASES.

Emma Lightfoot and Daniel Sinclair were both a little disordered for two or three days, and the former had four or five small pustules, but the latter had no eruption.

ONE HUNDRED AND EIGHTY-FIRST AND ONE HUNDRED AND EIGHTY-SECOND CASES.

Ann Hills and Catharine Donaldson had neither fever nor eruption,

ONE HUNDRED AND EIGHTY-THIRD CASE.

Ann Clarke was inoculated with the matter of cow-pox, taken from the arm of Peter Peters, which produced two or three small evanescent pustules; but no fever took place.

March 15.—John Buckthorpe, twenty-two years old; John Cater, fourteen years of age; Susan Tomlins, nineteen years old; Maria Burgess, four years old; and Sophia Burgess, three years old, were inoculated for the cow-pox, with matter taken from the arm of Joseph Wrench.

ONE HUNDRED AND EIGHTY-FOURTH CASE,

John Buckthorpe was indisposed from the ninth till the fourteenth day. He had nearly 100 pustules.

ONE HUNDRED AND EIGHTY-FIFTH CASE.

John Cater complained of headache, etc., from the eighth till the eleventh day. He had forty pustules.

ONE HUNDRED AND EIGHTY-SIXTH CASE.

Susan Tomlins continued ill for three days. She had twenty-four pustules.

ONE HUNDRED AND EIGHTY-SEVENTH AND ONE HUNDRED AND EIGHTY-EIGHTH CASES

Maria and Sophia Burgess were neither indisposed from the inoculation. Sophia had no pustules and Maria only three.

March 18 —The following persons were inoculated with the matter of cow-pox, taken from the arm of Elizabeth Platford: John Williams, seven months old; James Runtsman, three months old; Robert Lear seventeen months old; John Selby, five months old; Samuel Ariell, two years old; James Ariell, five years old; Henry Servy, two years and a half old; Sarah Lovell, four years old; Henry Lovell, two years old; Rebecca Salmon, nine months old; John Corwell, eight months old, and Francis Cundell, six months old.

ONE HUNDRED AND EIGHTY-NINTH CASE.

John Williams had no indisposition nor pustules. The tumor was surrounded with an efflorescence on the eleventh day.

ONE HUNDRED AND NINETIETH CASE.

James Runtsman was a little feverish on the evening of the tenth. He had no eruption.

ONE HUNDRED AND NINETY-FIRST CASE.

Robert Lear's case was similar to that of Runtsman.

ONE HUNDRED AND NINETY-SECOND CASE.

John Selby was feverish two days, and had forty pustules.

ONE HUNDRED AND NINETY-THIRD AND ONE HUNDRED AND NINETY-FOURTH CASES

Samuel Ariell and James Ariell were both feverish on the tenth and eleventh days, but neither had any eruption.

ONE HUNDRED AND NINETY-FIFTH AND ONE HUNDRED AND NINETY-SIXTH CASES.

Henry Servy and Sarah Lovell were disordered two days. The former had no pustules, the latter forty

ONE HUNDRED AND NINETY-SEVENTH CASE.

Henry Lorell was ill three days, and had 170 pustules.

ONE HUNDRED AND NINETY-EIGHTH CASE.

Rebecca Salmon was very slightly indisposed, but had about 200 pustules, which were very small.

ONE HUNDRED AND NINETY-NINTH AND TWO HUNDREDTH CASES.

John Corwell and Francis Cundell were both feverish for two or three days; the former had thirty six and the latter twelve pustules.

All the above patients, inoculated since the 6th of March, have subsequently had variolous matter inserted in their arms, except the two Ariells, but it produced no disorder.

In order that the progressive descent of the cow-pox infection from patient to patient, as well as the magnitude of the disease which was excited by the inoculation, may be comprehended at one view, I have subjoined the following tabular statement.

It may be observed that the matter used for the preceding inoculations was not only derived immediately from the pustular eruptions upon the teats of the cow, but also from Sarah Rice, who contracted the disease by milking the infected cows. I begin with the former. In the first and second divisions opposite to the names the age in years or months is recorded; in the third the number of days during which the febrile symptoms continued; and in the last, the number of pustules produced:

TABLE.

	Years of Age	Months.	Days of Illness.	No. of Pustules.
From the cow to—				
M. Payne	2	6	3	0
E. Payne	..	4	5	0
Buckland	..	4	4	24
R. Payne	10	..	0	5
Redding	16	..	1	4
Collingridge	17	..	4	170
Pink	15	..	0	0
From M. and E. Payne to—				
Talley	14	..	..	..
Brown	15	..	..	..
From Collingride to—				
Mundy	25	..	2	15
George	25	..	6	530
Butcher	13	..	2	0
Dorset	19	..	1	0
From Buckland's pustules to—				
S. Price	13	..	2	6
From Redding to—				
Wife	14	..	0	4
From Mundy to—				
Slade	21	..	5	4
From George to—				
Tarrant	19	..	1	0
From Butcher to—				
Jewel	20	..	2	0
Bumpus	20	..	6	310
West	21	..	5	20
W. Hull	11	..	4	200
H. Hull	13	..	1	8
S. Hull	8	..	2	120
From Jewel to—				
Fisk	..	4	4	40
Reed	15	..	5	70
From S. Price to—				
Pedder	..	11	5	40
Hoole	..	5	5	102
Hickland	..	6	3	300
Morton	..	9	7	200
From Fisk to—				
Davy	..	3	1	3
Murrell	..	7	4	20
From Bumpus to—				
Dixon	19	..	4	174
W. Walker	..	11	0	0
Cummins	..	3	0	0
Ellistone	..	3	2	0
Dunn	..	8	3	0
From West to—				
So. Dobinson	5	..	0	0
Sarah Dobinson	3	..	0	0
H. Dobinson	1	..	1	0
Giles	20	..	30	30
From West to—				
Bigg	18	..	5	12
Briaris	16	..	4	2
From Reed to—				
Cowling	23	..	4	50
Webb	12	..	0	12
Mason	2	6	0	4
Goodluck	..	3	2	0
From Murrell to—				
Hatt	20	..	4	40
Platford	17	..	8	1000
From H. Dobinson to—				
Gunter	1	..	2	3
Sears	..	9	5	200
E. Giles	..	9	3	90
From Dixon's pustule to—				
C. Harriskind	4	..	4	100
W. Harriskind	2	..	3	12
D. Harding	..	3	1	15
E. Harding	3	..	1	2
Waters	12	6	1	20
J. Harding	17	..	1	10
From Webb to—				
H. Timms	19	..	7	165
From Webb to—				
S. Timms	17	..	5	0
Franklin	12	..	1	0
Lee	15	..	2	3
From Hatt to—				
Spooner	21	..	4	110
J. M. Wall	14	..	3	10
J. Wall	10	..	0	0
J. Ockendon	10	..	3	0
W. Ockendon	12	..	3	1
W. Jennings	7	..	2	1
G. Jennings	6	..	2	0
Pluckrose	7	..	0	0
C. Webb	..	3	0	0
Dibden	..	3	1	0
E. Eaton	2	..	2	2
C. Eaton	..	10	2	2
Pigg	11	..	4	14
From Platford to—				
Williams	..	7	0	0
Runtsman	..	3	1	0
Lear	1	5	1	0
Selby	..	5	2	40
S. Ariell	2	..	2	0
J. Ariell	5	..	2	0
Servy	2	6	2	0
S. Lovell	4	..	2	40
H. Lovell	2	..	3	170
Salmon	..	9	1	200
Corwell	..	8	3	36
Cundell	..	6	2	12
From S. Rice to—				
Harris	21	..	0	300
Bunker	15	..	3	3
Crouch	7	..	0	0
Fox	25	..	..	..
Dennis	23	..	..	..
From Crouch to—				
Keys	25	..	1	0
Turner	24	..	6	220
Morgan	1	..	5	0
From Mr. Coleman's cow to—				
Streeton	22	..	6	300
Smith	16	..	4	105
Meacock	30	..	5	350
From Turner to—				
Fairbrother	15	..	4	4
Calloway	19	..	3	20
Camplin	17	..	4	30
J. Turner	..	8	2	1000
Buckley	..	5	1	0
Welch	..	3	1	0
From Streeton to—				
Grenvill	20	..	3	35
Honeywood	2	..	0	0
Rood	1	6	2	0
Mile	1	3	0	0
Jenkins	1	..	3	300
Barber	..	11	2	1
Dix	..	11	0	6
A. Walker	..	10	2	0
Brough	..	10	3	20
Towser	..	8	2	10
Knighton	..	8	2	0
Price	..	8	1	0
Spilsbury	..	4	2	0
May	..	4	4	5
Sully	..	3	1	0
Terry	..	2	1	1
Scott	..	2	1	0
Johnston	..	2	0	0
Stewart	..	2	0	0
From Smith to—				
Wrench	24	..	3	30
S. Peters	19	..	4	1
P. Peters	18	..	4	24
Brown	5	..	0	0

	Years of Age.	Months.	Days of Illness	No. of Pustules
From Smith to—				
Shipley	3	..	0	1
Crosby	..	10	0	0
Evans	..	7	2	0
From Meacock to—				
C. Cooke	4	..	0	0
A. Cooke	2	..	0	0
From Brown to—				
R. Scott	2	6	1	14
Bennett	1	..	0	0
Black	1	..	3	7
M. Jenkins	..	9	1	0
Lawyer	..	8	0	0
From Brown to—				
King	..	6	0	0
Jones	..	6	0	0
Phipps	..	6	3	0
Newman	..	6	4	0
Harper	..	5	2	0
From May to—				
G. Paul	3	..	0	2
A. Paul	1	.	3	40
Chandler	..	5	0	0
M. Hatt	1	..	1	5
Boardore	..	7	0	0
Lampart	2	..	2	3
Page	1	6	0	0
Carter	..	1	2	3
Sermon	..	6	3	5
A. Marshall	2	..	0	0
H. Marshall	..	4	0	0
Henley	5	..	0	0
New	1	6	4	100
From Turner's pustules to—				
M. Crouch	3	..	0	0
From Stewart to—				
Wood	3	..	1	0
Clifford	2	6	1	0
From A. Walker to—				
Restieux	..	4	0	0
Bates	1½	0	0	0
Thompson	2	..	1	2
W. London	..	6	0	0
J. London	..	6	0	0
From A. Walker to—				
Wallace	3	..	2	0
Rogers	42	..	3	0
T. Thoroughgood	14	..	3	33
A. Thoroughgood	17	..	6	10
From Streeton's pustules to—				
S. Reeve	1	6	1	20
A. Reeve	..	1	1	12
Richardson	13	..	3	12
Adams	..	6	3	200
From Phipps to—				
Shipton	4	..	0	0
Staits	2	..	2	3
Youngman	..	3	0	0
Dudley	2	..	1	50
Cade	..	10	0	0
Piper	..	4	1	0
From Lampart to—				
M. Ockendon	16	..	4	6
S. Ockendon	17	.	3	4
S. Stacey	12	..	4	0
A. Stacey	7	..	4	0
Fuller	11	..	4	6
Barrett	11	..	4	20
Perry	3	..	0	0
Vinicum	..	5	0	0
Bensden	1	6	0	0
Ward	..	10	2	7
Terry	..	2	0	0
C. Poorey	3	..	0	0
A. Poorey	..	11	2	0
Langstaff	4	6	0	0
Lightfoot	1	1	2	5
Sinclair	..	7	2	0
Hills	..	4	0	0
Donaldson	1	7	0	0
From Wrench to—				
Buckthorpe	22	..	4	100
Cater	14	..	3	40
Tomlin	19	.	3	24
M. Burgess	4	..	0	3
S. Burgess	3	..	0	0
From P. Peters to –				
Clarke	5	..	0	3

The preceding table comprehends all the cases originally intended to have been given in the work, the publication of which, from a concurrence of circumstances, has been delayed much longer than the author expected, and has thereby afforded him an opportunity of making the following additions:

	Years of Age.	Months.	Days of Illness.	No. of Pustules.
From Platford's pustues to—				
Prince	1	..	0	30
Chandler	1	9	0	40
Jervoise	..	6	1	0
Palmer	..	3	3	100
Henderson	..	10	4	300
Crawford	1	10	3	250
From Dudley to—				
A. Valentine	3	..	2	0
J. Valentine	2	..	3	0
From S. Timms to				
S. Harris	21	..	7	6
S. Clarke	..	9	2	0
M. Harris	23	..	6	60
Ladgrove	.	11	2	0
Stringer	20	..	4	2
From Grenville to—				
B. Crane	2	..	3	200
T. Crane	4	..	2	12
Garrett	14	..	4	62
M. Crane	8	..	4	30
From A. Stacey to—				
M. Stacey	38	..	3	5
R. Stacey	..	7	0	12
J. Stacey	3	6	0	5
From A. Stacey to—				
Harriott	..	8	1	6
M. Waite	..	10	2	50
J. Waite	3	..	2	20
From M. Ockendon to—				
H. Pigley	22	..	4	100
Dach	..	4½	0	0
G. Pigley	..	5	0	0
Morgon	..	2½	0	0
Bradley	19	..	6	156
Harrison	..	2	1	0
Morton	..	5	0	0
Cooper	4	11	0	0
E. Cooper	..	4	1	0
Ellikins	3	3	0	0
M. Hide	4	11	0	0
D. Hide	1	5	0	0
Phillips	..	8	0	0
From Tomlin to—				
C. Hopes	3	..	1	0
S. Hopes	1	..	0	0
Oliphant	3	..	1	0
Castin	..	6	3	0
Hamm	2	..	0	0
A. Smith	4	..	0	0

	Years of Age.	Months.	Days of Illness.	No. of Pustules.
From Tomlin to—				
Reynolds	..	4	0	0
From J. Wall to—				
Gallway	..	3	1	0
Barneby	1	6	0	0
Dick	2	8	0	3
Dalkins	..	5½	1	0
Bromley	1	2	2	3
Ford	..	6	2	0
From J. Vallentine to—				
Merrin	..	3	0	0
Loathis	4	.	3	5
Gedge	..	4½	0	0
Beasley	..	3	0	4
Goodman	1	10	2	40
From Spooner to—				
Stainer	16	..	3	34
M. Pepler	4	..	0	0
Swannell	10	..	3	6
F. Pepler	2	..	0	0
Brown	19	..	4	35
P. Roberts	6	..	4	12
M. Roberts	4	..	0	6
C. Roberts	1	8	3	6
Freeman	11	..	4	40
A. Palmer	..	9	2	40
Wade	16	..	4	3
From Cooper to—				
Munden	..	7	1	50
From H. Timm's pustules to—				
Stiles	..	6	3	500
Burrows	..	5	1	12
From M. Bartlett to—				
J. Mundy	..	6	3	100
From Cowley to—				
Nash	15	..	1	0
From Spooner's pustules to—				
Serjeant	16	..	4	35
Cook	15	..	2	11
From Stringer's pustules to—				
Argant	17	..	7	19
From H. Timm's pustules to—				
E. Gilbert	17	..	3	4
Brewster	11	..	4	6
Trulock	..	6	2	250
Wiggins	..	5	0	7
Th. Turner	..	6	0	50
Gilbert	..	6	3	500
Downes	..	4	2	30
King	..	2	2	4
Talbot	..	4	3	500
From Corwell to—				
Graham	..	4	0	0
Sellers	15	..	0	0
From Barrett to—				
T. Barrett	32	..	3	200
M. Barrett	5	..	0	0
J. Barrett	2	3	1	0
H. Barrett	..	7	2	30
E. Wybrow	5	..	3	200
T. Wybrow	9	..	3	150
J. Wybrow	1	.	1	6
Harwood	2	3	1	6
M. Harwood	4	..	0	12
J. Harwood	5	..	2	6
P. Harwood	..	5	4	200
Higgins	..	3	0	0
M. Higgins	2	6	0	5
From Henderson to—				
Upstone	19	..	5	12
I. Bumpus	16	..	5	20
From S. Harris to—				
Tyler	13	..	0	0
W. Meacock	18	..	5	400
R. Meacock	1	..	3	6
M. Meacock	29	..	5	20
Porch	3	6	0	2
E. Porch	2	..	0	0
J. Porch	..	4	3	350
Fermoy	..	11	0	60
Gurney	..	11	0	0
Downs	1	6	2	300
From Wade to—				
Mays	1	1	2	500
From J. Mundy to—				
Matthews	..	4	2	0
From Brewster to—				
M. Brewster	..	11	0	0
From Lee's pustules to—				
Baker	29	..	3	140
Caterer	15	6	5	8
R. Featherstone	12	..	3	40
C. Featherstone	9	..	3	120
Porter	5	..	0	9
From Lee's pustules to—				
J. Porter	1	6	1	12
J. Jennings	5	..	1	30
C. Jennings	3	..	1	30
W. Jennings	1	1	0	9
Mansfield	1	6	2	12
S. Wybrow	6	..	2	300
S. Baker	1	1	3	25
J. Goss	2	8	1	0
W. Goss	..	8	2	30
Odell	..	9	3	90
Murphield	..	6	2	0
From Dalkins to—				
Sharp	..	4	2	0
From Waite to—				
T. Jennings	1	6	0	0
Kitchen	5	..	1	0
S. Pluckrose	4	..	2	0
T. Pluckrose	..	10	2	0
Rout	..	6	1	20
W. Houghton	2	6	1	0
From Swannell to—				
Mickland	..	2	0	3
Ferguson	..	7	1	7
Goddard	1	..	2	0
Roberts	..	9	1	0
Gran	..	6	1	0
Benson	..	8	2	0
Floaks	..	2	1	2
From M. Gilbert to—				
Welch	15	..	3	100
Rowley	..	3	2	25
A. Waite	17	..	4	10
Tarbotts	1	1	2	600
S. Tarbotts	3	3	4	300
Bell	..	3	3	250
From S. Hopes to—				
Snell	17	..	2	200
I. Houghton	32	..	3	200
Stedman	..	6	2	60
M. Broadwood	..	6	2	200
Sorrell	4	11	4	500
S. Sorrell	6	..	1	1
Underwood	..	9	2	105
From Ellikin to—				
G. Cooke	2	2	3	20
Costin	..	5	2	0
From Reynolds to—				
Walford	..	6	2	600
From Wade to—				
Wenworth	1	8	3	500
Gibson	..	8	6	0
Lister	..	5	0	0
Wooden	1	4	4	0
Smart	6	..	2	0
Taylor	1	..	1	200
Arnold	..	5	3	0
Turvey	..	3	2	
Guilder	2	3	2	
Gallap	..	2	2	
Stanny	2	2	4	
Moore	..	4	0	
M. Moore	2	6	1	
From Oliphant to—				
Absalom	..	7	1	
From M. Ford to—				
Clark	2	4	3	
Cox	1	7	2	
Sandaw	..	2	0	

	Years of Age	Months.	Days of Illness.	No. of Pustules.
From J. Roberts to—				
T. Roberts	3	..	3	0
From Kitchen to—				
T. Foster	5	..	2	5
J. Foster	1	..	1	2
M. Foster	1	..	1	24
S. Gobby	27	..	2	20
W. Gobby	5	..	0	2
J. Gobby	..	6	3	0
Putney	..	7	2	0
Bush	1	7	1	0
E. Franklin	3	..	2	0
S. Franklin	..	8	0	0
Neat	2	..	2	9
Hicks	3	..	2	0
More	..	5	0	0
Barker	6	..	2	6
North	2	..	3	0
Cowland	1	3	3	12
Harrison	..	8	1	5
R. Lawyer	36	..	1	1
E. Lawyer	3	6	1	7
F. Lawyer	4	6	0	0
M. Lawyer	1	..	0	0
E. Dunn	5	..	0	0
F. Dunn	2	6	0	0
T. Dunn	..	3	2	6
N. Collop	9	..	1	0
J. Collop	7	..	1	0
A. Collop	3	..	1	0
E. Collop	..	5	0	0
T. Wiggins	7	..	0	0
W. Wiggins	4	..	0	0
P. Wiggins	1	6	0	0
Ruffles	19	..	2	6
Bridges	..	1	0	0
From J. Barrett to—				
I. Mitchell	6	..	2	200
P. Mitchell	2	..	2	50
T. Mitchell	2	..	2	26
From Cook to—				
E. Chapman	12	..	2	27
M. Chapman	9	..	3	67
Good	13	..	4	400
From Styles to—				
Edwards	18	..	3	0
From Talbot to—				
Brandrom	12	..	0	0
From Caterer to—				
Stapler	22	..	4	300
Marsham	17	..	4	43
Waller	18	..	3	15
Wall	8	..	3	200
R. Johnston	..	3	2	0
Fletcher	..	6	3	500
From Bradley's pustules to—				
Vaughan	..	5	2	12
Vethall	..	4	3	200
Hope	..	6	4	100
Masterson	..	5	2	20
Green	2	4	3	30
Lotman	1	..	2	20
Roberts	..	3	4	50
Starbuck	..	5	2	20
M. Phillips	2	2	3	500
S. Phillips	3	11	3	5
Wicks	..	4	3	36
Terry	..	3	2	8
Sheriff	7	..	3	34
Steers	13	..	3	40
From I. Houghton to—				
S. Houghton	19	..	0	0
W. Houghton	58	..	0	0
Jolly	1	8	0	0
From T. Pinckrose to—				
Linean	12	..	3	3
Woodlard	2	..	0	0
From Kitchen to—				
Kettridge	16	..	1	3
Raymond	1	..	1	3
From I. Harwood to—				
A. Harris	26	..	4	100
M. Harris	..	1	4	500
S. Harris	4	6	5	50
W. Harris	5	6	2	25
G. Harris	2	6	1	5
S. Boyton	8	..	4	700
E. Boyton	6	..	3	600
J. Boyton	3	..	3	350
From Talbot to—				
Lemare	..	6	3	60
Williams	..	9	4	650
English	1	3	2	100
Churchman	..	3	4	30
Hunt	1	2	4	700
Whitburn	..	9	4	430
Chartau	..	10	4	17
Callen	..	8	3	75
Russel	..	5	4	15
E. Russel	3	6	3	12
Knight	..	8	3	500
Richardson	..	6	2	200
Johnston	1	7	3	150
From J. Goss to—				
Blinkinborn	..	2	0	0
Millward	..	7	0	5
Haywood	1	8	4	46
A. Godden	1	..	2	300
W. Godden	3	..	3	650
Jones	..	6	0	0
Paradise	3	..	3	50
Kelly	2	..	0	100
Hales	..	6	4	500
I. Mountain	4	6	2	300
M. Mountain	2	..	2	150
A. Mountain	1	..	1	75
From Brewster to—				
Barnett	1	1	0	0
Balling	..	9	2	6
Upton	1	9	3	0
Finn	1	1	2	0
Hilliard	..	6	0	0
White	1	4	1	0
From W. Meacock to—				
Westbrook	..	3	0	0
From E. Chapman to—				
Hider	..	2	1	0
Hughes	1	8	3	12
C. Hughes	..	5	2	4
From M. Chapman to—				
Sharp	18	0	3	30
Calburn	16	..	3	12
Ledger	..	4	2	50
Vautin	1	..	1	2
McKennish	4	3	2	150
Wright	..	7	3	10
Rance	..	2	0	0
From Ruffles to—				
Thornton	17	..	1	0
Boreham	16	..	2	3
Pill	..	5	1	0
Towler	1	3	1	0
French	..	11	0	0
Brestley	..	8	0	0
Thomas	..	4	1	0
Richardson	..	9	0	0
Morgan	..	5	0	0
From A. Waite to—				
Wood	22	..	4	6
Young	16	..	2	0
Norman	12	..	2	0
M. Bartlett	..	11	1	20
Askew	..	3	0	15
Clark	..	9	0	0

Those who are acquainted with the history of the cow-pox, will, no doubt, be surprised to find from the preceding cases that pustules have frequently been the consequence of the inoculation of this disease. Indeed, when I first observed a pustular eruption upon Buckland, (Case 3d) the occurrence being wholly unexpected, I was not without apprehension that the lancet which was employed in its inoculation might have had some particles of variolous matter adhering to it. But this suspicion was soon removed, for, upon enquiry, I found that all the lancets which I had used on the twenty-first of January were then made use of for the first time since they had been ground by the cutler.

Among the patients inoculated for the cow-pox during the first week in which I obtained the matter of this disease, several were so circumstanced as to be afterwards constantly exposed to the infection of the cow-pox. Having then had no proof that the progress of the infection of the former would supersede that of the latter, I used the precaution to inoculate the patients with variolous matter on the fifth day after that taken from the cow had been inserted. This led some medical gentlemen to suppose that the matter locally formed in the arm from the first inoculation might be variolated by the progress of the second inoculation in the other arm, and that consequently the matter generated in the cow-pox tumor with which others were inoculated would produce a hybrid disease and not the genuine small-pox. But as the matter employed in the cow-pox inoculations was always taken before the constitution could be effected by the variolous matter, and during the time that both inoculations were merely local diseases, I apprehend its effects would be the same as if the variolous inoculation had not taken place. Nay, had this not been the case, but had several patients been inoculated with matter taken from the cow-pox tumor on the arm of Jane Collingridge, after both the inoculations were supposed to have affected the constitution for several days, neither facts nor analogy lead us to believe that the matter thus obtained would produce any other disease than that of its own species, or that its specific morbid quality would be changed by entering into combination with the virus of the small-pox. The general character of the tumor formed by the inoculation of the small-pox is very different from that of the cow-pox; and though on the same day a person be inoculated in one arm with the matter of the cow-pox, and in the other with that of the small-pox, yet both tumors preserve their respective characteristic appearances throughout the whole course of the disease. This is certainly a strong proof that the two diseases, in respect to their local action, continue separate and distinct.

Twenty-eight patients were on the same day inoculated with the matter of cow-pox and that of the small-pox, mixed together in equal quantities, in order to try which would prevail, or if it were possible to produce a hybrid disease by a union of both. The result was that in more than one-half of the patients thus inoculated, the local affection distinctly assumed the characters of the cow-pox; in the others it more resembled the small-pox, but in none of them was there much indisposition or many pustules.

At the request of Dr. Jenner, I transmitted to him, in Gloucestershire, some of the cow-pox matter from the patients then under my care, which he used for the purpose of inoculation; after a trial of it he informed me that "the rise, progress and termination of the pustule created by this virus on the arm, was exactly that of the true uncontaminated cow-pox." The matter sent was taken from the arm of Ann Bumpus, who had 310 pustules, all of which suppurated; yet with the matter of this stock Dr. Jenner inoculated twenty, and another gentleman, in the same county, 140 persons, without producing any pustules which maturated.

This fact would appear to confirm an opinion entertained by Dr. Jenner. In his second publication on the variolæ vaccinæ he seems disposed to attribute the pustules which so often attended this disease in London and its vicinity, to some peculiar influence of the town air. But of the cases which I have stated, several were those of patients who were inoculated eight miles distance from London; yet these patients, in the proportion of about one in five, had an eruption. And at a small village, still farther from London, eighteen persons were inoculated with similar matter, in all of whom it produced pustules.

The Twenty-seventh case also affords decisive evidence that the matter employed in it was that of the cow-pox, for Jewel had undergone the small-pox when a child; yet the inoculation excited febrile symptoms of two or three day's duration, and the tumor which was produced upon her arm did not begin to scab till the thirteenth day.

Having now, I presume, given sufficient reasons for establishing the point for which they have been adduced, I shall proceed to enquire how far the effects of the cow-pox upon the human subject seem to differ from or correspond with those of the small-pox when communicated by inoculation.

The vaccine disease, as it has lately been called, affords a striking example, and perhaps the only one yet discovered, of a disorder which can be transferred from brute animals to man, and carried back from him to the brute. A remarkable instance of this is related at page 62, which shows that the matter of the cow-pox, as reproduced by inoculation in the human animal and inserted into the teat of a cow, produced the disease

Similar attempts were also made with variolous matter, which had no effect; hence, in this respect these two morbid poisons seem to differ. The cow-pox also differs from the small-pox in acting upon the constitutions of those who have undergone the latter disease, as was fully exemplified in the case of Frances Jewel. However, I am disposed to think that the matter of the cow-pox is not so capable of affecting persons who have had the small-pox as has been represented. I made several trials to inoculate this disease in patients at the hospital who were recovering from a full eruption of the natural small-pox, but in no instance did any tumor appear on the arm; neither does the insertion of the variolous matter, in such cases, excite the least inflammation in the skin. It is probable, therefore, that the matter of the cow-pox, like that of the small-pox, does not manifest any local action upon persons who have lately undergone the variolous disease. If a person has casually received the infection of the small-pox, and be inoculated with variolous matter three or four days before the eruptive symptoms supervene, the inoculated part does not tumify, as in other cases, but becomes a simple pustule; on the contrary, if a person has been inoculated, and the progress of the inoculation be so far advanced that the patient is within one day of the approach of the eruptive fever, and be then inoculated a second time, the tumor produced from the second inoculation will become nearly as extensixe as the first, and be in a state of suppuration a few hours after the fever commences. Hence it appears that the process of variolation in the natural and in the inoculated small-pox is different. The cow-pox, in every case with which we are acquainted, has been introduced into the human constitution through the medium of external local inflammation, and is therefore to be considered as an inoculated disease; the virus of it seems also to affect a similar mode of action, and to be governed by the same laws as that of the small-pox. Thus if a person be alternately inoculated with variolous matter and with that of the cow-pox every day till fever is excited, all the inoculations make a progress; and as soon as the whole system becomes disordered, they appear to be all equally advanced in maturation. However, the local tumor excited from the inoculation of the cow-pox is commonly of a different appearance from that which is the consequence of inoculation with variolous matter; for if the inoculation be performed by a simple puncture, the consequent tumor, in the proportion of three times out of four, or more, assumes a form completely circular, and it continues circumscribed, with its edges elevated and well defined, and its surface flat throughout every stage of the disease; while that which is produced from variolous matter, either preserves a pustular form or spreads along the skin, and becomes angulated and irregular, or disfigured by numerous vesiculæ.

Another distinction, still more general and decisive, is to be drawn from the contents of the cow-pox tumor; for the fluid it forms, unless from some accidental circumstance, very rarely becomes puriform, and the scab which succeeds is of a harder texture, exhibits a smoother surface, and differs in its color from that which is formed by the concretion of pus. All the appearances here described, however, do not constantly attend the disease, but are some times so much changed they can in no respect be distinguished from those which arise from the inoculation of the small-pox. When the disease thus deviates from its usual appearance at the inoculated part, its effects upon the constitution have commonly, though not always, been felt more severely than where the tumor was distinctly characterized.

As I have now pointed out the principal circumstances in which the two diseases usually differ in their local effects, I shall proceed to examine them in a more important point of view, and to compare their general effect upon the constitution, in order, if possible, to ascertain, from the facts already adduced, whether or not the inoculation of the vaccine disease produces a milder distemper, and of less dangerous consequences to the patient, than that of the small-pox. For if it be an established fact, as I presume it is, that those who have undergone the former disease are thereby rendered secure against the effects of the latter, it only remains to be proved, in order to make the former be generally adopted, that the disorder which attends the cow-pox is also less severe and less fatal than the other. The number of cases of cow-pox inoculated under my direction have amounted to about 600, but all these could not be included in the table, as at the time it was printed the disease, in many patients, was not far enough advanced to give the result; and to these may be added others who did not give proper attendance, and also some whose names I am not permitted to make public.

The table, however, contains a sufficient number of cases to enable the medical reader to form a tolerably correct judgment respecting the disease; and from considering what would have probably been the effects of an equal number of cases of variolous inoculation, he may draw his own conclusions. But before this is done, I have to observe, that since the table was composed, an infant at the breast died on the eleventh day after the cow-pox matter had been inserted in its arm. In this solitary fatal case, the local tumor was very inconsiderable, and the eruptive symptoms took place on the seventh day, when the child was attacked with fits of the spasmodic kind, which recurred at short intervals with increased violence, and carried it off at the time above mentioned, after an eruption of eighty or one hundred pustules.

It appears, therefore, that out of about five hundred cases of the inoculated cow-pox one proved fatal, and the preceding table shows that in some others the disease, from the number of the pustules, was of formidable severity; while, on the other hand, a very large proportion of the patients were scarcely disordered from the inoculation, and had no pustules.

Were I enabled to state a number of cases of variolous inoculation, equal to those given above, and reduced to a similar tabular form, the comparative magnitude of the two diseases might be estimated with tolerable precision. It is evident, however, that the matter of the vaccine disease has generally produced much fewer pustules, and less indisposition than that of the small-pox; for it appears from the preceding statement that about two-fifths of all the persons inoculated for the variolæ vaccinæ, had no pustules, and that in not more than a fourth part of them was there experienced any perceptible disorders of the constitution. But it must be acknowledged, that in several instances, the cow-pox has proved a very severe disease. In three or four cases, out of five hundred, the patient has been in considerable danger, and one child, as I have already observed, actually died under the effects of the disease. Now, if it be admitted that at an average, one of five hundred will die of the inoculated cow-pox, I confess I should not be disposed to introduce this disease into the Inoculation Hospital, because, out of the last five thousand cases of variolous inoculation, the number of deaths has not exceeded the proportion of one in six hundred. But I am inclined to think, that if the matter of the cow-pox, used for the purpose of inoculation, were only taken from those in whom the disease appeared in a very mild form, the result would be more favorable than in the statement here given. For though it has occasionally happened, that the matter taken from the arm of a patient, in whom the disorder neither produced fever nor eruption, has in others produced both; yet still it has much more commonly had the effect of exciting a milder disease than the matter of the pustules, or than that which was obtained from a patient who had the disease in a severe manner, as may be seen by and examination of the table.

Thus we find, that out of sixty-two persons, who were inoculated with the pustule matter, fifty-seven had an eruption; and those who received the disease from any of these fifty-seven patients, appear also to have had pustules in nearly the same proportion I may also remark, that the disease, before noticed as proving fatal to a patient, was excited from matter of this description, and taken from Talbot. Whence it appears, that the cow-pox, from certain circumstances, is not only liable to lose the characters which distinguish it from the small-pox, but also to continue to propagate itself under this new and casual modification. The vaccine variolæ, the human variolæ, ought, therefore, to be considered as only varieties of the same disease, rather than as distinct species.

One important advantage which the cow-pox is supposed to have over the small-pox is that the former is not a contagious disease, and not to be propagated by the effluvia of persons infected with it. This is certainly true when the disorder is confined to the inoculated part, but where it produces numerous pustules upon the body, the exhalation they send forth are capable of infecting others in the same manner as the small-pox. Two instances of casual infection in this way have lately fallen under my observation; in one the disease was severe, and the eruption confluent; in the other the disease was mild, and the pustules few.

It has been asserted, that persons have had the small-pox after having been affected with the cow-pox; and some facts have been published with a view to show that instances of this kind have actually happened. But all these, as far as I have seen, have been very defective in not affording sufficient proof, that the affection supposed to have been the cow-pox, was in reality that disease. On the other hand, the instances which have been brought forward to prove that those who had undergone the genuine cow-pox resisted the infection of the small-pox, are unquestionably decisive, and sufficiently numerous to establish the fact in the most satisfactory manner. This circumstance then appears to be as much a general law of the system, as that a person having had the small-pox is thereby rendered unsusceptible of receiving the disease a second time. For of all the patients whom I inoculated with variolous matter, after they had passed through the cow-pox, amounting to upwards of four hundred, none were affected with the small-pox; and it may be remarked, that nearly a fourth part of this number was so slightly affected with the cow-pox, that it neither produced any perceptible indisposition nor pustules.

We have been told, that the cow-pox tumor has frequently produced erysipelatous inflammation, and phagedenic ulceration; but the inoculated part has not ulcerated in any of the cases which have been under my care, nor have I observed inflammation to occasion any inconvenience, except in one instance, where it was soon subdued by the application of *aqua lithargyri acetati.* It should seem then, that the advantages to be derived from substituting the cow-pox for the small-pox, must be directly in proportion to the greater mildness of the former, than the latter disease.

[End of Woodville on Cow-Pox.]

THE ERRORS OF DRS. WOODVILLE AND PEARSON AROSE FROM THE PERFORMANCE OF COW-POX INOCULATION IN AN ATMOSPHERE POISONED BY THE CONTAGIOUS EMANATIONS OF SMALL-POX.

CORRECTION OF THE ERRORS OF DR. WOODVILLE BY DR. JENNER.

EXPERIMENTS OF DR. ROBERT WILLAN IN THE YEARS 1799 AND 1800, ON THE COMBINED INOCULATION OF THE VARIOLOUS AND VACCINE FLUIDS—REFERENCES ILLUSTRATING THE EXTENSIVE NATURE OF THE CONTRIBUTIONS BY VARIOUS OBSERVERS TO THE LITERATURE OF COW-POX INOCULATION, DURING THE FIRST FIVE YEARS AFTER JENNER'S ANNOUNCEMENT OF HIS DISCOVERY.

It is evident from the preceding reports of Dr. Woodville, that he endeavored to establish, that the substitution of vaccina in place of small-pox, would be of little or no advantage to mankind, as it was in many cases attended with eruptions not inferior in severity to those arising from variolous inoculation.

The error into which the gentleman fell with regard to the eruptions being an effect of cow-pox in the inoculated form, was due to the performance of his experiments in a location and atmosphere poisoned by the emanations or contagium of small-pox.

Dr. Woodville performed the inoculation from whence these cases originated, in an hospital appropriated to variolous inoculation. In such a place the atmosphere would necessarily have been surcharged with small-pox infection, and the building with every article of furniture of such an establishment, must have been loaded with variolous effluvia; hence the eruptions are easily accounted for, as a person is susceptible of vaccine impression, notwithstanding he may, at the time of vaccination, have the infection of small-pox in his system, or even have passed through that disease.

Many of the patients experimented on by Dr. Woodville at the small-pox hospital in London, besides being exposed to variolous atmosphere, actually had small-pox matter inserted into the arm on the third and fifth days after vaccination.

Dr. Jenner had positively asserted that pustules do not belong to the cow-pox, as he had never seen them produced by genuine vaccine matter.

Dr. Woodville, on the contrary, reported that three-fifths of the patients whom he had inoculated with vaccine matter had pustules not to be distinguished from variolous ones. A statement of this kind, from such a quarter, so much at variance with what had been anticipated, excited the strongest feelings of disappointment among the principal medical men of London, and for a season threw considerable doubt on Dr. Jenner's accuracy.

From the commencement Dr. Jenner suspected the real cause of this deviation; but he was willing to give the gentlemen who began the experiments in London the benefit of every supposition that might tend to acquit them of the blunder which they had actually made. He thought it possible that there might be some peculiarity either in the constitution of the individual vaccinated, or something in the nature of the virus itself that might occasion the eruptions; but after admitting these suppositions *he could not divest himself of the suspicion that the London cow-pox was somehow or other compounded with small-pox.* When Dr. Jenner became fully acquainted with the manner of conducting the practice in the small-pox hospital, this conviction amounted to certainty; and at a latter period he declared to Dr. Woodville that the matter had absolutely been *contaminated* in the hospital. There are facts to show that this *impure matter* was really disseminated over many parts of England, and also on the continent, in place of that of the true variolæ vaccinæ.

Dr. Robert Willan,* in his valuable work on "Vaccine Inoculation," published in 1806, details in the first section some experiments made during the years 1799 and 1800, on the *combined inoculation* of the variolous and vaccine fluids.

From these experiments it appears that:

> "The variolous and vaccine fluids inoculated about the same time, restrain the action of each other on the human body, so that in some cases the vaccine vesicle is smaller than usual, and has a very slow progress; in other cases the areola is scarcely perceptible; while in others it is large but premature; and the variolous eruption consists of hard, distinct, shining pustules, which have but little inflammation round them, and which seldom maturate.
>
> Some of these pustules are tubuculated; and the small quantity of matter contained in them soon disappears, leaving the cuticle which confined it, horny and elevated for many days afterwards. The rest of the eruption is minute and papulous, not suppurating but desquamating. I was fully satisfied that the pustules, produced under these circumstances, were genuine variolous pustules, as many opportunities occurred to me of ascertaining, by inoculation from them, that they were capable of producing every variety of the small-pox, from the mild and distinct, to the confluent and more dangerous form of the disease. Dr. Woodville, who considered them to be secondary vaccine pustules or vesicles, often inoculated from them and transmitted to several of his friends; we may, hence, perhaps, account for the appearance of pustules, in persons supposed to have been properly vaccinated, in different parts of the country. I may, however, observe, that fluid, taken from the vaccine vesicle, in the arm of a person affected with the variolous fever and eruption, and inserted in the arm of another person by a clean lance, produced the vaccine disease alone." P. 56.

Dr. Robert Willan, held that the chief nicety and difficulty of vaccination is, in distinguishing from the genuine cow-pox, some irregular vesicles which have often been mistaken for it, and which do not wholly secure the constitution from the small-pox.

Dr. Willan gives the following concise description of the irregular vaccine vesicles:

**On Vaccine Inoculation*. By Robert Willan, M. D. F. R. A. S. Physician Extraordinary to the Fever Institution, and to the Public Dispensary in London, quarto, 108 pages, with colored engravings, and an appendix of 54 pages. Philips, 1806.

"I have observed three sorts of these irregular vesicles. The first is a single pearl-colored visicle, set in a hard dark red base, slightly elevated. It is larger and more globate than the spurious *pustule* above represented, but much less than the genuine vesicle; its top is flattened, or sometimes a little depressed; but the margin is not rounded or prominent. The second appears to be cellular, like the genuine vesicle, but is somewhat smaller and more sessile and has a sharp angulated edge.

"In the first, the areolar is usually diffuse, and of a dark rose color; in the second, it is somewhat of a dilute scarlet color, radiated and very extensive, as from the sting of a wasp; at other times, it has the form and color exhibited in Plate 1, No. 7. The areola appears round these vesicles on the seventh or eighth day after inoculation, and continues more or less vivid for three days, during which the scab is completely formed. The scab is smaller, and less regular than that which succeeds the genuine vesicle; it also falls off much sooner; and, when seperated, leaves a smaller cicatrix which is sometimes angulated. The third irregular appearance is a vesicle without an areola." *On Vaccine Inoculation p.* 39-40.

As the degree of security afforded by these irregular vesicles is different in different persons, and, as the matter taken from them often produces the same imperfect form of the disease, it can scarcely be doubted that many mistakes and failures originated from this source. Dr. Willan therefore suggested the propriety of confining the practice of vaccination to those who had had a sufficiant education, and who had minutely attended to the subject. He also further recommended a strict examination of all persons inoculated between the first of January, 1799, and the first of January, 1802, and urged the necessity of re-inoculation in every doubtful case.

With reference to the *cutaneous and glandular affections imputed to vaccination*, Dr. Willan did not observe any new disease of the skin referable to the cow-pox. Dr. Willan endeavored to prove by a table, extracted from the register books of the public dispensary in London, that the number of cutaneous complaints was not increasing, their proportion to all other diseases having been the same before the publication of Dr. Jenner's inquiry as in the sixth and seventh year of vaccination. *On Vaccine Inoculation*, p. 82.

The prime object of this division of our work on the prevention and arrest of contagious and infectious diseases, is to present those facts and original documents which illustrate the history and relations of small-pox and cow-pox, and which will furnish the sanitarians, physicians and legislators of Louisanna, and of all other States in the American Union the fundamental principles for the enactment of wise, just and efficacious regulations and laws for the absolute arrest of the most loathsome and destructive pestilence which has ever afflicted the human race.

A minute analysis therefore of the various publications * relative to vaccination, would be a useless waste of time, for the essential facts will be found in the works of the original observers which have been, or which will be, dissecated and recorded in the progress of the present vindication of vaccination.

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* We append the following references in order to illustrate the rich and extensive nature of the contributions by various observers to the literature of cow-pox inoculation during the first five years after Jenner's announcement of his discovery:

Dr. Pearson's Letter on the Effects of Inoculating the Vaccine Disease. The London Medical Review and Magazine, by a Society of Physicians and Surgeons, vol. 1, March to August, 1799, p. 201, p. 349.

Dr. Woodville's Note on the Cow-pox, addressed to the Society of Physicians and Surgeons. London Med. Review and Magazine, vol. 1, p 397.

A communication from Dr. Hooper, respecting the Susceptibility of Persons Exposed to the Variolous Contagion after having had the Cow-pox. London Medical Review and Magazine, vol. 1, 1799, p. 505.

Extracts of Letters from Mr. Cooke, Apothecary at Glocester. London Medical Review and Magazine, vol 1, p. 591.

Answers by Mr. Jacobs, Attorney-at-Law, Bristol, to Queries proposed by the Editor, respecting the Cow-pox. London Medical Review and Magazine, vol. 1, p. 599.

A statement of the Progress in the Vaccine Inoculation, and Experiments to determine some important Facts belonging to the Vaccine Disease, by George Pearson, M. D., F. R. S. Physician to St. George's Hospital, etc. London Medical Review and Magazine, vol. 1, p. 612.

Observations on Dr. Hooper's Cases of the Cow-pox, by the Rev. J. D. Fosbrooke, M. A., Curate of Horsley, Gloucestershire. London Medical Review and Magazine, vol. 1, p. 628.

A communication concerning the Eruptions Resembling the Small-pox, which sometimes appear in the Inoculated Vaccine Disease, by George Pearson, M. D., F. R. S., Physician to St. George's Hospital. London Medical Review and Magazine, September, 1799-1800, vol. 2, p. 393.

An Account of an Institution for Inoculating the Vaccine-pock, patronized by His Royal Highness the Duke of York, at No. 36 Warwick street, Golden Square. London Medical Review and Magazine, vol. 2, p. 475.

Remarks on Dr. Pearson's communication concerning the Eruptions resembling the Small-pox, which sometimes appear in the Inoculated Vaccine Disease. By the Rev. F. D. Fosbrooke, M. A. F. A. S., Curate of Horsley, Gloucestershire. London Medical Review and Magazine, vol. 2, p. 481.

Observations on the Cow-pox. By Mr. John Chapman, Surgeon at Ampthill, Bedfordshire; communicated by Dr. Pearson. M. D., F. R. S. London Medical Review and Magazine, March to June, 1800, vol. 3, p. 77.

Translation of a letter from Mr. Stromeger to Mr. Hunneman, concerning the Vaccine Inoculation practiced by him; dated Hanover, March 24, 1800. London Medical Review and Magazine, vol. 3, p. 174.

Information relating to the Cow-pox; communicated by Mr, R. J. Taynton, Surgeon at Bromley, in Kent. London Medical Review and Magazine, vol. 3. p, 179.

Cases and Observations tending to prove either the Infectious Nature of the Cow-pox, or the fallacy of some experiments made in London. By Mr. Blair, Surgeon of the Lock Hospital and Ferisbury Dispensary, etc. London Medical Review and Magazine, vol. 3, p. 188.

Remarks on Mr. Blair's paper concerning the Infectious Nature of Cow-pox, and on that of Mr. Taynton relative to the same subject. By John Resig, Member of the Royal College of Surgeons in London. London Medical Review and Magazine, 1800, vol. 3, p. 312.

Notice relating to the Cow-pox Institution. London Medical Review and Magazine, vol. 3, p. 316.

Observations on Certain Peculiarities of the Cow-pox. By Mr. John Resig, Member of the Royal College of Surgeons; with Additional Remarks by the Editors. London Medical Review and Magazine, vol. 3, p. 417.

Notice of a Testimonial in Favor of the Cow-pox; signed by several Physicians and Surgeons in London, June, 1800. London Medical Review and Magazine, vol. 3, p. 420.

Further Remarks on the Infectious Nature of the Cow-pox. By Mr. Blair, Surgeon of the York Hospital and Asylum, and of the Ferisbury Dispensary, etc. London Medical Review and Magazine, vol. 3, p. 421.

Some further Observations and Experiments on the Vaccine Inoculation. By G. Pearson, M. D., F. R. S., London, Physician to St. George's Hospital, London; in a letter to Dr. Duncan. London Medical Review and Magazine, vol. 3, p. 78.

Reflections on the Cow-pox, illustrated by cases to prove it an absolute security against the small-pox. Addressed to the public in a letter to Dr. Jenner, from William Fermor, Esq., octavo, 47 pages; Robson, London, 1800.

The vaccine matter employed by Mr. Fermor was originally derived from the Rev. Mr. Jenner, of Berkley. The total number of his cow-pox patients amounted to 326, of which number, 173 were afterwards inoculated with the small-pox without taking the infection. In only two instances did any vaccine eruptions appear, except on the inoculated part; a single pustule on the forehead of one, and likewise one on the arm of another.

An Address to the Public on the Advantages of Vaccine Inoculation; with the objections to it refuted. By Henry Jenner, Surgeon, F. L. S, etc., quarto, 19 pages; Cadell & Davies, London.

Some Observations on Vaccination, or the Inoculation of Cow-pox. By Richard Dunning, Surgeon, Plymouth Dock, and Member of the Medical Society of that Town and Plymouth, octavo, 122 pages; Cadell & Davies, London, 1800.

Observations on the Cow-pox. By William Woodville, M. D., Physician to the Small-pox and Inoculation Hospitals, octavo, 43 pages; Phillips, London, 1800.

Copy of a Testimonial in favor of the Vaccine Inoculation, signed by thirty-six Physicians and Surgeons in London. London Medical Review and Magazine, vol. 4, July to December, 1800, p. 60.

Further information respecting the case of Cow-pox which was lately communicated by Mr. Malim, with observations by the Editor. London Medical Review and Magazine, vol. 4, 1800, p. 208.

Additional Observations on the Variform Eruptions which have occurred in the Cow-pox, with some further remarks on the origin of the disease. By Mr. Ring, Member of the Royal College of Surgeons in London. London Medical Review and Magazine, July to October, 1800, vol. 4. p. 91.

On the Introduction of the Vaccine Inoculation at Paris (A. Monsieur Pearson, Médecin de l'Hôpital de l'Inoculation Vaccine à Londres). London Medical Review and Magazine, vol. 4, p. 204.

Further Remarks on Variolated Vaccine Matter, and on Mr. Malim's case of Cow-pox. By Mr. Ring, Member of the Royal College of Surgeons in London. London Medical Review and Magazine, vol. 4. p. 307.

Facts relating to the origin of the Cow-pox, communicated by Sir Christopher Pegge, Knight, M. D., and Reader of Anatomy, Oxford. London Medical Review and Magazine, November, 1800, to February, 1801, vol. 5, p. 76.

Authentic information relative to some extraordinary cases of the Cow-pox at Clapham. By Mr. Pears, F. M. S., etc.; with a postscript by the Editors. London Medical Review and Magazine, vol. 5, p. 276.

Facts concerning the Eruptions and Contagious Nature of the Cow-pox. By Mr. Harrup, of Cholsham. London Medical Review and Magazine, vol. 5, p. 289.

Rapport sur la Vaccine; ou Réponse aux Questions Rédigées par les Commissaires de l'Ecole de Médecine de Paris, sur la Pratique et les Résultats de céte Nouvelle Inoculation en Angleterre, et dans les Hóspices des Londres, on on l'Adopté. Par A Aubert, Docteur en Médecine; Paris, An 9.

Copy of a letter on the Cow-pox, from Dr. Marshall to Mr. Ring, dated Gibralter, August 23, 1800. London Medical Review and Magazine, vol. 5. p. 100.

A Concise View of Circumstances and Proceedings respecting Vaccine Inoculation, etc., etc. London, 1800.

A concise view of all the most important facts which have hitherto appeared concerning the Cow-pox. By C. R. Aikin, Member of the Royal College of Surgeons in London; Phillips, London, 1800.

A comparative statement of Facts and Observations relative to the Cow-pox; published by Drs. Jenner and Woodville, London, 1800.

Copy of a letter from Dr. Marshall to Mr. Ring, dated Mabon, Island of Miaorrca, September, 1800. London Medical Review and Magazine, vol. 5, p 198.

Copy of a letter from Dr. Marshall to Mr. Ring, dated H. M. S. Fondrazars, Gibraltar Bay, October 16, 1 800. London Medical Review and Magazine, vol. 5, p. 199.

Additional Signatures to the Testimonial in favor of Vaccine Inoculation. London Medical Review and Magazine, vol. 5, p. 315.

That the labors of Dr. Jenner were recognized by the wisest and most able representatives of his own country, within ten years after the announcement of his discovery, is shown by the following report of the Royal College ot Physicians of London, on vaccination in 1807.

This report, with the accompanying opinions of the Royal College of Physicians of Edinburgh and Dublin, and of the Royal College of Surgeons of London, of Dublin and of Edinburgh, made in accordance with an address from the House of Commons and in compliance with the commands of the King of England, should be regarded as one of the ablest and most impartial of the testimonials which have at different times and in different countries been received in favor of vaccination.

REPORT OF THE ROYAL COLLEGE OF PHYSICIANS OF LONDON, ON VACCINATION. WITH AN APPENDIX, CONTAINING THE OPINIONS OF THE ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH AND DUBLIN; AND OF THE ROYAL COLLEGES OF SURGEONS OF LONDON, OF DUBLIN, AND OF EDINBURGH.

The Royal College of Physicians of London, having received his Majesty's commands, in compliance with an address from the House of Commons, "to inquire into the state of vaccine inoculation in the United Kingdom, to report their opinion and observations upon that practice, upon the evidence which has been adduced in its support, and upon the causes which have hitherto retarded its general adoption;" have applied themselves diligently to the business referred to them.

Deeply impressed with the importance of an inquiry which equally involves the lives of individuals and the public prosperity, they have made every exertion to investigate the subject fully and impartially. In aid of the knowledge and experience of the members of their own body, they have applied separately to each of the Licentiates of the college; they have corresponded with the Colleges of Physicians of Dublin and Edinburgh; with the Colleges of Surgeons of London Edinburgh and Dublin; they have called upon the societies established for vaccination, for an account of their practice, to what extent it has been carried on, and what has been the result of their experience; and they have, by public notice, invited individuals to contribute whatever information they had severally collected. They have in consequence been furnished with a mass of evidence communicated with the greatest readiness and candor, which enables them to speak with confidence upon all the principal points referred to them.

I. During eight years which have elapsed since Dr. Jenner made his discovery public the progress of vaccination has been rapid, not only in all parts of the United Kingdom, but in every quarter of the civilized world. In the British Islands some hundred thousands have been vaccinated; in our possession in the East Indies upwards of 800,000, and among the nations of Europe the practice has become general. Professional men have submitted it to the fairest trials, and the public have, for the most part, received it without prejudice. A few indeed have stood forth the adversaries of vaccination, on the same

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The Report of the Cow-pock Inoculation from the Practice at the Vaccine Pock Institution, during the years 1800, 1801 and 1802. Read at the General Meeting of the Governors February 7, 1803, at the Shakspeare Tavern: written by the Physicians to the Institution; to which are prefixed two painted engravings of Cow-pox and other Eruptions. London, 1803.

Third Annual Report of the Vaccine Pock Institution for Inoculating the Poor, Supported by the Voluntary Subscriptions, Benefactions and legacies of the Public; From its Foundation, December 2, 1800, to December 31, 1802.

A case showing the impropriety of taking the whole of the virus out of a vaccine vesicle: communicated by Dr. Frederick Dalcho, Secretary to the Medical Society of South Carolina, to Dr. Michell, April 27, 1805. The Medical Repository, etc., vol 3, p. 204.

The cases reported by Dr. Frederick Dalcho, occurred in May, 1802.

"Remarks on the Cow-pox Inoculation, by Mr. Charles Brandon Frye."

From his own experience Mr. Frye asserted, *first*, that whatever *has been said against the sufficiency* of *Cow-pox* matter, as a security against variolous infection, may be also *said with truth against Small-pox matter*, as a similar security; *second*, that the subsequent ill effects which *have been said* to follow Cow-pox, have, in a ten-fold degree, followed Small pox; *third*, that many instances of mortality have happened in Small-pox inoculation, while amongst *all which has* been said, not a single example appears of death from Cow-pox.

grounds as their predecessors who opposed the inoculation for the small-pox, falsely led by hypothetical reasoning in the investigation of a subject which must be supported, or rejected, upon facts and observation only. With these few exceptions, the testimony in favor of vaccination has been most strong and satisfactory, and the practice of it, though it has received a check in some quarters, appears still to be upon the increase in most ports of the United Kingdom.

II. The College of Physicians, in giving their observations and opinions on the practice of vaccination, think it right to premise, that they advance nothing but what is supported by the multiplied and unequivocal evidence which has been brought before them, and they have not considered any facts as proved, but what have been stated from actual observation.

Vaccination appears to be in general perfectly safe; the instances to the contrary being extremely rare. The disease excited by it is slight, seldom preventing those under it from following their ordinary occupations. It has been communicated with safety to pregnant women, to children during dentition, and in their earliest infancy; in all which respects it possesses material advantages over inoculation for the small-pox; which, though productive of a disease generally mild, yet sometimes occasion alarming symptoms, and is in a few cases fatal.

The security derived from vaccination against the small-pox, if not absolutely perfect is as nearly so as can perhaps be expected from any human discovery; for amonst several hundred thousand cases, with the results which the College have been made acquainted, the number of alleged failures have been surprisingly small, so much so, as to form certainly no reasonable objection to the general adoption of vaccination, for it appears that there is not nearly so many failures in a given number of vaccinated persons, as there are deaths in an equal number of persons inoculated for the small-pox. Nothing can more cleary demonstrate the superiority of vaccination over the inoculation of the small-pox, than this consideration; and it is a most important fact, which has been confirmed in the course of this inquiry, that in almost every case where the small-pox has succeeded vaccination, whether by inoculation or by causul infection, the disease has varied much from its ordinary course; it has neither been the same in violence, nor in the duration of its symptoms, but has, with very few exceptions been remarkably mild, as if the small-pox had been deprived, by the previous vaccine disease, of all its usual malignity.

The testimonies before the College of Physicians are very decided in declaring, that vaccination does less mischief to the constitution and less frequently gives rise to other diseases, than small-pox, either natural or inoculated.

The College feel themselves called upon to state this strongly, because it has been objected to vaccination, that it produces new, unheard-of, and monstrous diseases. Of such assertions no proofs have been produced, and, after diligent inquiry, the College believe them to have been either the inventions of designing, or the mistakes of ignorant men. In these respects then, in its mildness, its safety, and its consequences, the individual may look for the peculiar advantages of vaccination. The benefits which flow from it to society are infinitely more considerable; it spreads no infection, and can be communicated only by inoculation. It is from a consideration of the pernicious effects of the small-pox, that the real value of vaccination is to be estimated. The natural small-pox has been supposed to destroy a sixth part of all whom it attacks; and that even by inoculation, where that has been general in parishes and towns, about one in 300 has usually died. It is not sufficiently known, or not adverted to, that nearly one-tenth, some years more than one-tenth of the whole mortality in London, is occasioned by the small-pox; and however beneficial the inoculation of the small-pox may have been to individuals, it appears to have kept up a constant source of contagion, which has been the means of increasing the number of deaths by what is called the natural disease. It cannot be doubted that this mischief has been extended by the inconsiderate manner in which great numbers of persons, even since the introduction of vaccination, are still every year inoculated with the small-pox, and afterwards required to attend two or three times a week at the places of inoculation, through every stage of their illness.

From this, then, the public are to expect the great and uncontroverted superiority of vaccination, that it communicates no casual infection, and, while it is a protection to the individual, it is not prejudicial to the public.

III. The College of Physicians, in reporting their observations and opinions on the evidence adduced in support of vaccination, feel themselves authorized to state that a body of evidence so large, so temperate, and so consistent, was perhaps never before collected upon any medical question. A discovery so novel, and to which there was nothing analogous known in nature, though resting on the experimental observations of the inventor, was at first received with diffidence; it was not, however, difficult for others to repeat his experiments, by which the truth of his observations was confirmed, and the doubts of the cautious were gradually dispelled by extensive experience. At the commencement of the practice, almost all that were vaccinated were afterwards submitted to the inoculation of the small-pox, many underwent this operation a second, and even a third time, and the uniform success of these trials quickly bred confidence in the new discovery. But the evidence of the security derived from vaccination against the small-pox does not rest alone upon those who afterwards underwent variolous inoculation, although amounting to many thousands; for it appears, from numerous observations communicated to the College, that those who have been vaccinated are equally secure against the small-pox does not rest alone upon those who afterwards underwent variolous inoculation, although amounting to many thousands; for it appears, from numerous observations communicated to the College, that those who have been vaccinated are equally secure against the contagion of epidemic small-pox. Towns, indeed, and districts of the country, in which vaccination had been general, have afterwards had the small-pox prevalent on all sides of them without suffering from the contagion. There are also in the evidence a few examples of epidemic small-pox having been subdued by a general vaccination. It will not, therefore, appear extraordinary that many who have communicated their observations should state, that though at first they thought unfavorably of the practice, experience had now removed all their doubts.

It has been already mentioned that the evidence is not universally favorable, although it is in truth nearly so, for there are a few who entertain sentiments differing widely from those of the great majority of their brethren. The College, therefore, deemed it their duty, in a particular manner, to inquire upon what grounds and evidence the opposers of vaccination rested their opinions. From personal examination, as well as from their writings, they endeavored to learn the full extent and weight of their objections. They found them without experience in vaccination, supporting their opinions by hearsay information and hypothetical reasoning; and, upon investigating the facts which they advanced, they found them to be either misapprehended or misrepresented, or that they fell under the description of cases of imperfect small-pox before noticed, and which the College have endeavored fairly to appreciate.

The practice of vaccination is but of eight years standing, and its promoters, as well as opponents, must keep in mind that a period so short is too limited to ascertain every point, or to bring the art to that perfection of which it may be capable. The truth of this will readily be admitted by those acquainted with the history of inoculation for the small-pox. Vaccination is now, however, well understood, and its character accurately described. Some deviations from the usual course have occasionally occurred, which the author of the practice has called spurious cow-pox, by which the public have been misled, as if there were a true and false cow-pox; but it appears that nothing more was meant than to express irregularity or difference from that common form and progress of the vaccine pustule from which its efficacy is inferred. Those who perform vaccination ought, therefore, to be well instructed, and should have watched with the greatest care the regular progress of the pustule, and learnt the most proper time for taking the matter. There is little doubt that some of the failures are to be imputed to the inexperience of the early vaccinators, and it is not unreasonable to expect that further observations will yet suggest many improvements that will reduce the number of anamalous cases, and furnishing the means of determining with greater precision, when the vaccine disease has been effectually received.

Though the College of Physicians have confined themselves in estimating the evidence of such facts as have occurred in their own country, because the accuracy of them could best be ascertained, they cannot be insensible to the confirmation these receive from the reports of the successful introduction of vaccination, not only into every part of Europe, but throughout the vast continents of Asia and America.

IV. Several causes have had a partial operation in retarding the general adoption of vaccination; some writers have greatly underrated the security it affords, while others have considered it to be of a temporary nature only; but if any reliance is to be placed on the statements which have been laid before the College, its power of protecting the human body from the small-pox, though not perfect indeed, is abundantly sufficient to recommend it to the prudent and dispassionate, especially as the small-pox, in the few instances where it has subsequently occurred, has been generally mild and transient. The opinion that vaccination affords but a temporary security is supported by no anology in nature, nor by the facts which have hitherto occurred. Although the experience of vaccine inoculation be only of a few years, yet the same disease, contracted by the milkers of cows, in some districts, has been long enough known to ascertain that in them, at least, the unsusceptible of the cow-pox contagion does not wear out of time. Another cause is the charge against vaccination of producing various new diseases of frightful and monstrous appearance.

Representations of some of these have been exhibited in print in a way to alarm the feelings of parents, and to infuse dread and apprehension into the minds of the uninformed. Publications with such representations have been widely circulated, and though they originate either in gross ignorance, or willful misrepresentation, yet have they lessened the confidence of many, particularly of the lower classes, in vaccination;

no permanent effects, however, in retarding the progress of vaccination need be apprehended from such causes, for, as soon as the public shall view them coolly and without surprise, they will excite contempt, and not fear.

Though the College of Physicians are of opinion that the progress of vaccination has been retarded in a few places by the above causes, yet they conceive that its general adoption has been prevented by causes far more powerful, and of a nature wholly different. The lower orders of society can hardly be induced to adopt precautions against evils which may be at a distance; nor can it be expected from them, if these precautions are attended with expense. Unless, therefore, from the immediate dread of epidemic small-pox, neither vaccination nor inoculation appear at any time to have been general, and when the cause of terror has passed by, the public have relapsed again into a state of indifference and apathy, and the satutary practice has come to a stand. It is not easy to suggest a remedy for an evil so deeply imprinted in human nature. To inform and instruct the public mind may do much, and it will probably be found that the progress of vaccination in different parts of the United Kingdom will be in proportion to that instruction. Were encouragement given to vaccination, by offering it to the poorer classes without expense, there is little doubt that it would in time supersede the inoculation for the small-pox, and thereby various sources of variolous infection would be cut off; but till vaccination becomes general, it will be impossible to prevent the constant recurrence of the natural small-pox by the means of those who are inoculated, except it should appear proper to the legislature to adopt, in its wisdom, some measure by which those who still, from terror or prejudice, prefer the small-pox to the vaccine disease, may, in thus consulting the gratification of their own feelings, be prevented from doing mischief to their neighbors.

From the whole of the above considerations, the College of Physicians feel it their duty strongly to recommend the practice of vaccination. They have been led to this conclusion by no preconceived opinion, but by the most unbiased judgment, formed from an irresistable weight of evidence, which has been laid before them. For when the number, the respectability, the disinterestedness and the extensive experience of its advocates is compared with the feeble and imperfect testimonies of its few opposers; and when it is considered that many, who were once adverse to vaccination, have been convinced by further trials, and are now to be ranked among its warmest supporters, the truth seems to be established as firmly as the nature of such a question admits; so that the College of Physicians conceive that the public may reasonably look forward with some degree of hope to the time when all opposition shall cease, and the general concurrence of mankind shall at length be able to put an end to the ravages, at least, if not to the existence, of small-pox.

LUCAS PEPYS, President,

Royal College of Physicians, April 10, 1807.

JA. HARVFY, Register.

APPENDIX.

NO. 1.

To the Royal College of Physicians of London:

Gentlemen—I am ordered by the King and Queen's College of Physicians, in Ireland, to thank the Royal College of Physicians, of London, for the communication they have had the honor to receive from them, of certain propositions relative to vaccination, whereon His Majesty has been pleased to direct an inquiry to be instituted, and in the prosecution of which the co-operation of the College in Ireland is requested.

And I am directed to acquaint you that the said College having referred the investigation of these propositions to a committee, have received from them a report, of which the inclosed is a copy; and that they desire the same may be considered as containing their opinion upon the subject. I have the honor to be, gentlemen,

Your most obedient humble servant,

HUGH FERGUSON, Register.

By order of the King and Queen's College of Physicians in Ireland.

Dublin, Nov. 11, 1806.

"The practice of vaccination was introduced in this city about the beginning of the year 1801, and appears to have made inconsiderable progress at first. A variety of causes operated to retard its general adoption, amongst which the novelty of the practice, and the extraordinary effects attributed to vaccination, would naturally take the lead.

"Variolous inoculation had been long, almost exclusively, in the hands of a particular branch of the profession, whose prejudices and interests were strongly opposed to the new practice; and by their being the usual medical attendants in families, and especially employed in the diseases of children, their opinions had greater effect upon the minds of parents. The small-pox is rendered a much less formidable disease in this country by the frequency of inoculation for it, than it is in other parts of His Majesty's dominions, where prejudices against inoculation have prevailed; hence, parents, not unnaturally, objected to the introduction of a new disease, rather than not recur to that, with the mildness and safety of which they were well acquainted.

"In the beginning of the year 1804, the Cow-Pox Institution was established, under the patronage of the Earl of Hardwicke, and it is from this period that we may date the general introduction of vaccination into this city, and throughout all parts of Ireland.

"The success of the institution, in forwarding the new practice, is to be attributed in a great measure to the respectability of the gentlemen who superintend it, and to the diligence, zeal and attention of Dr. Labatt, their secretary and inoculator. In order to show the progress which has been made in extending the vaccination, your committee refer to the report of the Cow-Pox Institution for the last two years, and to extracts from their Register for the present year:

YEAR.	Patients Inoculated.	Packets Issued to Practitioners in General.	Packets to Army Surgeons.
1804	578	776	236
1805	1032	1124	178
1806	1356	1340	220
Total	2966	3240	634

"In the above statement the numbers are averaged to the end of the present year, on the supposition of patients resorting to the institution as usual. The correspondence of the institution appears to be very general throughout every part of Ireland, and by accounts received, as well from medical practitioners as others, the success of vaccination seems to be uniform and effectual. At the present period, in the opinion of your committee, there are few individuals in any branch of the profession who oppose the practice of vaccination in this part of His Majesty's dominions.

"It is the opinion of your committee that the practice of cow-pox inoculation is safe, and that it fully answers all the purposes that have been intended by its introduction. At the same time, your committee is willing to allow that doubtful cases have been reported to them as having occurred, of persons suffering from small-pox, who had been previously vaccinated. Upon minute investigation, however, it has been found that these supposed instances originated generally in error, misrepresentation, or the difficulty of discriminating between small-pox and other eruptions, no case having come to the knowledge of your committee, duly authenticated by respectable and competent judges, of genuine small-pox succeeding the regular vaccine disease.

"The practice of vaccination becomes every day more extended; and, when it is considered that the period at which it came into general use in Ireland is to be reckoned from so late a date, your committee is of opinion that it has made as rapid a progress as could be expected. [Signed] "JAMES CLEGHORN,
"DANIEL MILLS,
"HUGH FERGUSON."

NO. II.

PHYSICIAN'S HALL, EDINBURGH, November 26, 1807.

Gentlemen—The Royal College of Physicians of Edinburgh have but little opportunity themselves of making observations of vaccination, as that practice is entirely conducted by surgeon apothecaries and other medical practitioners out of this College, and as the effects produced by it are so inconsiderable and slight that the aid of a physician is never required.

The College know that in Edinburgh it is universally approved by the profession, and by the higher and middle ranks of the community, and that it has been much more generally adopted by the lower orders of the people than even the inoculation of small-pox was, and they believe the same to obtain all over Scotland.

With regard to any causes which have hitherto prevented its general adoption, they are acquainted with none, except the negligence or ignorance of parents among the common people, or their mistaken ideas of the impropriety or criminality of being accessory to the production of any disease among their children, or the difficulty or impossibility, in some of our country districts, of producing vaccine matter, or a proper person to vaccinate.

The evidence in favor of vaccination appeared to the Royal College of Physicians of Edinburgh so strong and decisive that in May last they spontaneously and unanimously elected Dr. Jenner an Honorary Fellow of their College—a mark of distinction which they rarely confer, and which they confine almost exclusively to foreign physicians of the first eminence.

They did this with a view to publish their opinion with regard to vaccination, and in testimony of their conviction of the immense benefits which have been, and which will in future be derived to the world, from inoculation for the cow-pox, and as a mark of their sense of Dr. Jenner's very great merits and ability in introducing and promoting this invaluable practice.

I have the honor to be, gentlemen, your most obedient humble servant,

TH. SPENS, C. R. M. ED. PR.

To the Royal College of Physicians of London.

NO. III.

At a Special Court of Assistants of the Royal College of Surgeons, convened by order of the Master, and holden at the College on the seventeenth day of March, 1807; Mr. Governor Lucas in the chair; Mr. Long, as Chairman of the Board of Curators, reported: That the Board are now ready to deliver their report on the subject of vaccination.

It was then moved, seconded, and resolved, that a report from the Board of Curators, on the subject of vaccination, which was referred to their consideration by the Court of Assistants, on the twenty-first day of November last, be received.

Mr. Long then delivered to Mr. Governor Lucas (presiding in the absence of the Master) a report from the Board of Curators.

It was then moved, seconded, and resolved, that the report delivered by Mr. Long be read; and it was read accordingly, as follows:

TO THE COURT OF ASSISTANTS OF THE ROYAL COLLEGE OF SURGEONS IN LONDON:

The Report of the Board of Curators, on the subject of Vaccination, referred to them by the Court, on the twenty-first day of November, 1806; made to the Court on the seventeenth of March, 1807.

The Court of Assistants having received a letter from the Royal College of Physicians of London, addressed to this College, stating, that His Majesty had been graciously pleased, in compliance with an address from the Honorable House of Commons, to direct his Royal College of Physicians of London to inquire into the state of vaccination in the United Kingdom, to report their observations and opinion upon that practice, upon the evidence adduced in its support, and upon the causes which have hitherto retarded its general adoption; that the college was then engaged in the investigation of the several propositions thus referred to them, and requesting the college to co-operate and communicate with them, in order that the report thereupon might be made as complete as possible.

And having, on the twenty-first day of November last, referred such letter to the consideration of the Board of Curators, with authority to take such steps respecting the contents thereof as they should judge proper, and report their proceedings thereon, from time to time, to the Court; the Board proceeded with all possible dispatch to the consideration of the subject.

The Board being of the opinion that it would be proper to address circulars to members of the College, with a view of collecting evidence, they submitted to the consideration of the Court, holden on the fifteenth day of December last, the drafts of such letter as appeared to them best calculated to answer that end; and the same having been approved by the Court, they caused copies thereof to be sent to all the members of the College, in the United Kingdom, whose residence could be ascertained, in the following form, viz:

"*Sir*—The Royal College of Surgeons being desirous to co-operate with the Royal College of Physicians of London, in obtaining information respecting vaccination, submit to you the following questions, to which the favor of your answer is requested.

"By order of the Court of Assistants. OKEY BELFOUR, Secretary.

"Lincoln's Inn Fields, December 15, 1806.

"QUESTIONS.

"*First*—How many persons have you vaccinated?

"*Second*—Have any of your patients had the small-pox after vaccination? In the case of every such occurrence, at what period was the vaccine matter taken from the vesicle? How was it preserved? How long before it was inserted? What was the appearance of the inflammation? And what the interval between vaccination and variolous eruption?

"*Third*—Have any bad effects occurred in your experience in consequence of vaccination? And, if so, what were they?

"*Fourth*—Is the practice of vaccination increasing or decreasing in your neighborhood; if decreasing, to what cause do you impute it?

To such letters the Board have received 426 answers; and the following are the results of their investigation:

The number of persons, stated in such letters to have been vaccinated, is 164,381.

The number of cases in which small-pox had followed vaccination is fifty-six.

The Board thinks it proper to remark, under this head, that in the enumeration of cases in which small-pox has succeeded vaccination, they have included none but those in which the subject was vaccinated by the surgeon reporting the facts.

The bad consequences which have arisen from vaccination are, eruptions of the skin in sixty-six cases, and inflammation of the arm in twenty-four instances, of which three proved fatal.

Vaccination, in the greater number of counties from which reports have been received, appears to be increasing; it may be proper, however, to remark, that, in the metropolis, it is on the decrease.

The principal reasons assigned for decrease are: Imperfect vaccination; instances of small-pox after vaccination; supposed bad consequences; publications against the practice; popular prejudices.

And such report having been considered, it was moved, seconded, and resolved, that the report now read be adopted by this Court as the answer of the Court to the letter of the Royal College of Physicians, of the twenty-third of October last, on the subject of vaccination.

Resolved, That a copy of these minutes and resolutions, signed by Mr. Governor Lucas (presiding at this Court in the absence of the Master), be transmitted by the Secretary to the Register of the Royal College of Physicians. [Signed] WM. LUCAS.

NO. IV.

EDINBURGH, March 3, 1807.

Sir—I mentioned in my former letter that I would take the earliest opportunity of laying before the Royal College of Surgeons of Edinburgh the communication with which the Royal College of Physicians of London had honored them, on the twenty-third of October last.

I am now directed by the Royal College to send the following answer on that important subject:

The practice of vaccine inoculation, both in private and at the Vaccine Institution, established here in 1801, is increasing so rapidly that for two or three years past the small-pox has been reckoned rather a rare occurrence, even amongst the lower order of the inhabitants of this city, unless in some particular quarters, about twelve months ago; and, among the higher ranks of the inhabitants, the disease is unknown.

The members of the Royal College of Surgeons have much pleasure in reporting, That, as far as their experience goes, they have no doubt of the permanent security against the small-pox which is produced by the constiiutional affection of the cow-pox; and that such has hitherto been their success in vaccination, as also to gain for it the confidence of the public, insomuch that they have not been required, for some years past, to inoculate any person with small-pox who had not previously undergone the inoculation with the cow-pox.

The members of the Royal College have met with no occurrence in their practice of cow-pox inoculation which could operate in their minds to its disadvantage, and they beg leave particularly to notice that they have seen no instance of obstinate eruptions, or of new and dangerous diseases, which they could attribute to the introduction among mankind of this mild preventive of the small-pox. The Royal College of Surgeons know of no causes which have hitherto retarded the adoption of vaccine inoculation here; on the contrary, the practice has become general within this city; and from many thousand packets of vaccine matter having been sent by the members of the Royal College, and the Vaccine Institution here, to all parts of the country, the Royal College have reason to believe that the practice has been as generally adopted throughout this part of the United Kingdom as could have been expected from proper medical assistance, and other circumstances of that nature.

I have the honor to be, Sir, your obedient servant,

WM. FARQUHARSON,

President of the Royal College and Incorporation of Surgeons of Edinburgh.

NO. V.

ROYAL COLLEGE OF SURGEONS IN IRELAND,
DUBLIN, FEBRUARY 4, 1807.

Sir—I am directed to transmit to you the enclosed report of a committee of the College of Surgeons in Ireland, to whom was referred a letter from the Royal College of Physicians in London, relative to the present state of vaccination in this part of the United Kingdom; and to state, that the College of Surgeons will be highly gratified by more frequent opportunities of corresponding with the English College of Physicians on any subject which may conduce to the advancement of science and the welfare of the public.

I have the honor to be, Sir, your most obedient humble servant,
JAMES HENTHORN, Secretary,

At a meeting of the Royal College of Surgeons in Ireland, holden at their Theatre, on Tuesday, the thirteenth day of January, 1807; Francis M'Evoy, Esq., President; Mr. Johnson reported from the committee, to whom was referred a letter from the College of Physicians, London, relative to the present state of vaccination in the United Kingdom, etc.; that they met and came to the following resolutions:]

That it appears to this committee, That inoculation with vaccine infection is now very generally adopted by the surgical practitioners in this part of the Kingdom as a preventive for small-pox.

That it appears to this committee, That from the twenty-fifth day of March, 1800, to the twenty-fifth of November, 1806, 11,504 persons have been inoculated with vaccine infection at the dispensary for infant poor, and 2,831 at the cow-pox institution, making a total of 14,335, exclusive of the number inoculated at hospitals and other places, where no registry is made and preserved.

That it is the opinion of the committee, That the cow-pox has been found to be a mild disease, and rarely attended with danger, or any alarming symptom, and that the few cases of small-pox which have occurred in this country, after supposed vaccination, have been satisfactorily proved to have arisen from accidental circumstances, and cannot be attributed to the want of efficacy in the genuine vaccine infection as a preventive of small-pox.

That it is the opinion of this committee, that the causes which have hitherto retarded the more general adoption of vaccination in Ireland, have, in a great measure, proceeded from the prejudices of the lower classes of the people, and the interest of some irregular practitioners.

To which report the College agrees.*

[Extract from the Minutes]
JAMES HENTHORN, Secretary.

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*In addition to the above highly satisfactory document, it may be proper to state, that the English House of Commons have just voted £20,000 additional to Dr. Jenner, as the discoverer of vaccination.

THE OCCASIONAL OCCURRENCE OF SMALL-POX AND MODIFIED SMALL-POX (VARIOLOID), AFTER VACCINATION EXCITED IN THE MINDS OF SOME DISTRUST AS TO THE PROTECTIVE POWER OF COW-POX INOCULATION, AND LEAD TO CAREFUL INVESTIGATION ON THE PART OF THE ADVOCATES OF VACCINATION. THE YEAR 1804 FORMED AN ERA IN THE HISTORY OF VARIOLÆ VACCINÆ. DR. JENNER REFERRED THE REPUTED FAILURES OF VACCINATION TO SEVERAL CAUSES,AS: IGNORANCE AND CARELESSNESS ON THE PART OF MANY INOCULATORS, WHO FAILED TO DISCRIMINATE WITH DUE ACCURACY BETWEEN THE PERFECT AND IMPERFECT PUSTULE; SUCH MODIFICATION OF THE VACCINE PUSTULE DURING ITS PROGRESS AS TO DEPRIVE IT OF ITS EFFICACY; THE POWER OF THE HERPETIC AND OTHER IRRITABLE ERUPTIONS TO RENDER THE VARIOLOUS AS WELL AS THE VACCINE INOCULATION IMPERFECT.

The year 1804 formed an era in the history of variolæ vaccinæ, for at this time the reports of failures in vaccination had begun to multiply, and the fears of some of its supporters had been thereby excited to an immoderate degree. Whilst Jenner deplored the ignorance that gave occasion to such rumors, he felt no anxiety concerning his great and fundamental position. Writing to Lord Berkeley on this subject, he said: "I expect that cases of this kind will flow in upon me in no inconsiderable number; and for this plain reason—a great number, perhaps—the majority of those who inoculate are not sufficiently acquainted with the nature of the disease to enable them to discriminate with due accuracy between the perfect and imperfect pustule. This is a lesson not difficult to learn, but unless it is learned, to inoculate the cow-pox is folly and presumption."

To another correspondent he said.

"What I have *said on this vaccine subject is true. If properly conducted, it secures the constitution as much as variolous inoculation possibly can. It is the small-pox in a purer form than that which has been current among us for twelve centuries past."*

Mr. Goldson, of Portsea, actuated by prejudice, joined Dr. Moseley in his conjectural arguments against vaccination. In 1804 the assertion was made that the cow-pox afforded only a temporary security. Had it been correct, it would have deprived the discovery of Dr. Jenner of nearly all its value. This assertion was very easily made, and in the infancy of the practice, could not be well disproved. To these circumstances it was owing that the crude and unsupported statements of Mr. Goldson acquired any influence. Dr. Jenner himself, from the commencement, perceived that in his cases of failure, cow-pox had never properly taken place.

The real merits of the question were also detected by Mr. Dunning, one of the first British surgeons who stood forward to recommend vaccination, soon after the practice was promulgated, and to the day of his death upheld the accuracy and justness of Jenner's views. His little tract, published about this time, under the title of "A Short Detail of Some Circumstances Connected with Vaccine Inoculation," etc., contains some of the soundest opinions with regard to the nature of variolæ and variolæ vaccinæ that have ever appeared. It was by studying small-pox that he became thoroughly acquainted both with the benefits conferred by vaccination and those principles that ought to direct the practice.

Some of the points which are even at the present time matters of discussion, were fully explained at this early period of vaccination. It was then clearly ascertained, that there were deviations from the usual course of small-pox, which was quite as common, and infinitely more disastrous, than those which took place in vaccination. These deviations regarded two apparently different states of the constitution. In the one, the susceptibility of small-pox was not taken away by previous infection; while on the other hand, some constitutions seem to be unsusceptible of small-pox infection altogether. It was found, that similar occurrences took place in the practice of vaccination; but as the security which the latter afforded was more likely to be interfered with by slight cases than the former, it became absolutely necessary that good care should be shown in watching the progress and character of the pustule.

Dr. Jenner had from the beginning felt the propriety of this watchfulness; and had distinctly announced that it was possible to propagate an affection by inoculation conveying different degrees of security, according as that affection approached to, or receded from, the full and perfect standard. He also clearly stated, that the course of the vaccine pustules might be so modified as to deprive it of its efficacy; that inoculation from such a source might communicate an inefficient protection, and that all who were thus vaccinated were more or less liable to subsequent small-pox. His directions for obviating occurrences of this kind regarded, *first*, the character of the pustule itself, the time and quality of the lymph taken for inoculation, and all other circumstances that might go to affect the completed progress of the disorder. He attached great importance to this last point; and in the course of 1804 published his tract "On the Varieties and Modifications of the Vaccine Pustule, Occasioned by an Herpetic State of the Skin."

The following sentence in the introduction is worthy of note:

> "I shall here just observe, that the most ample testimonies now lie before me, supporting my opinion that the herpetic, and some other irritive eruptions, are capable of rendering variolous inoculation imperfect, as well as the vaccine."

Besides the instructions which Dr. Jenner himself had published, for the purpose of securing perfection in the vaccine process, Mr. Dunning has the merit of establishing a canon, namely, that one pustule *at least* should remain undisturbed. Dr. Jenner candidly admitted the propriety of this rule of Mr. Dunning.

In a letter to Dr. Willan, dated February 23, 1806, Dr. Jenner says:

> "It strikes me that the constitution loses its susceptibility of small-pox contagion, and the capability of producing the disease in its ordinary state, in proportion to the degree of perfection which the vaccine vesicle has put on in its progress; and that the small-pox, if taken subsequently, is modified accordingly; this opinion was first published by Mr. Dunning of Plymouth."

In a letter to his friend Mr. Dunning, dated Berkeley, December 23, 1804, Dr. Jenner thus alludes to the work of Goldson:

> "You speak of Ring, and Goldson. Recollect then was the time to be cool. What came of vaccination—what man well acquainted with its nature, or that of the small-pox, could read Goldson's book, and lay it down cooly? Ring, the moment he read it, and that, indeed, which was infinitely worse than the book itself, the murderous harbinger—the advertisement, instantly charged his blunderbuss, and fired in the face of the author. I must freely confess, I do not feel so cooly about Mr. Goldson as you do. His book has sent many a victim to a premature grave; and would have sent many more, but for the humanity and zeal of yourself and others who stepped forward to counteract its dread-

ful tendancy. Had Goldson but written to me, stating those occurances in his practice which appeared extraordinary, I should with the greatest pleasure have told him where the mistake lay; and made him a good vaccinest. * * *

"But to return. There may be peculiarities of constitution favorable to this phenomenon. My opinion still is, that the grand interference is from the agency of this herpes, in some form or other; for I have discovered that it is a very Proteus, assuming as it thinks fit, the character of the greater part of the irritative eruptions that assail us. I shall have much to say on this disease one of these days."

"The security given to the constitution by vaccine inoculation, is exactly equal to that given by the variolous. As failures in the latter are constantly presenting themselves, nearly from its commencement to the present time, we must expect to find them in the former also. In my opinion, in either case, they occur from the same causes; one might name for example, among others, some peculiarities of constitution which prevent the virus from acting properly, even when properly applied; from inattention or want of due knowledge in not being able to discriminate between the correct and incorrect pustule." * * *

"Wonderful as it is, yet there are abundant facts to prove, that the insertion of variolous matter into the skin has produced a virus fit for the purpose of continuing the inoculation; and yet the person who has borne it, and on whose skin it was generated, has subsequently been infected with the small-pox, on exposure to its influence. Just so with the vaccine."

"Vaccine inoculation has certainly unveiled many of the mysterious facts attendant upon the small-pox and its inoculation. How often have we seen (apparently) the full effects of the arm from the insertion of variolous matter, indisposition and even eruptions following it, and its termination in an extensive and deep cicatrix; and yet, on exposure, the person who underwent this, has caught the small-pox."

In one of his journals, Dr. Jenner has left the following notes upon the same subject:

"The origin of the small-pox is the same as that of the cow-pox; and as the *latter* was probably coeval with the brute creation, the former was only a variety springing from it."

"There are certainly more forms than one (without considering the common variation between the confluent and distinct) in which the small-pox appears in what is called the natural way."

"It will be inquired (if the foregoing reasoning be *a priori* correct) in which way can the action of cow-pox (or the equine pock) in preventing subsequently small-pox be reconcilable with the established laws of the animal economy? My reply is, for the reasons which I have stated on the basis of facts, that they were not *bona fide dissimilar* in their nature; but, on the contrary, *identical*. On this ground I gave my first book of 'An Inquiry into the Causes and Effects of the *Variolæ Vaccinæ*'—a circumstance which has since been regarded by many as the happy foresight of a connection which was destined by further evidence to become more warranted."—*The Life of Edward Jenner, M. D., LL. D., F. R. S., Etc., by John Baron, M. D., F. R. S., vol.* 2, *pp.* 12-31.

THE EPIDEMIC SMALL-POX OF 1818—THE PREVALENCE OF SMALL-POX IN GREAT BRITAIN AND ON THE CONTINENT DEVELOPED INCREASED HOSTILITY TO THE PRACTICE OF VACCINATION—DR. JENNER BELIEVED IMPERFECT VACCINATION, OR SOME CAUSE WHICH INTERFERED WITH THE REGULAR AND COMPLETE PROGRESS OF THAT INFECTION TO BE THE MAIN SOURCE OF SUCH EVILS—SOME OF THE DIFFICULTIES WHICH PERPLEXED THE SUBJECT IN EDINBURGH; ALSO, FROM A DEGREE OF UNCERTAINTY THAT PREVAILED REGARDING THE CHARACTER OF THE EPIDEMIC AT ITS FIRST APPEARANCE, DR. HENNEN AND OTHERS WERE INCLINED TO THINK THAT THE DISEASE WAS VARICELLA OR CHICKEN-POX OF A MALIGNANT CHARACTER—ABANDONMENT OF THIS VIEW—INVESTIGATIONS OF DR. ALEXANEER MONRO, OF EDINBURGH, OF THE VARIETIES OF SMALL-POX AND THE EFFICACY OF COW-POX INOCULATION—HIS EXPLANATION OF THE CAUSES OF THE PREVALENCE OF SMALL-POX IN 1817 AND 1818.

In the course of the year 1818 a violent epidemic of small-pox prevailed in many parts of Great Britain, as well as on the continent; an increased hostility was evinced to the practice of vaccination; and doubts of its efficacy, which had been artfully excited, soon propagated to other parts of the world. The small-pox was unusually fatal and malignant in Edinburgh and several other places in Scotland; it killed a very large proportion of those whom it attacked in the natural way; and it likewise spread to many who had previously had small-pox, as well as cow-pox.

Dr. Jenner believed improper vaccination, or some cause which interfered with the regular and complete progress of that affection, to be the main source of such evils. He admitted that small-pox might succeed perfect vaccination, just as small-pox does succeed small-pox; but the great number of failures which were reported to have occurred, he thought, could only be accounted for by supposing that some circumstances interrupted the proper influence of vaccination in the system. One of them he conceived to be the existence of cutaneous disease.

There can be no doubt of the truth of Jenner's main proposition, published in his circular letter, namely, that when vaccine failures were very frequent, there must have been some imperfections either in the virus or in the progress of the affection. This fact is rendered manifest by the different degrees of success which have attended the practice of different individuals. After patient inquiry, Dr. John Baron, the learned and accomplished author of the life of Dr. Jenner, did not know of more than six or eight cases of small-pox after cow-pox among all Dr. Jenner's patients. This proportion is probably no more than might have occurred had he inoculated for the small-pox instead of the cow-pox.

Some of the difficulties which perplexed the subject in Edinburgh, arose from a degree of uncertainty that prevailed regarding the character of the demic at its first appearance, Dr. Hennen was inclined to think that the disease was varicella or chicken-pox, of a malignant character. He was obliged, however, to abandon this notion. Dr. Thompson went further than Dr. Hennen; and in a very elaborate work endeavored to prove that the varicella, instead of being a distinct and peculiar disease, as had been generally supposed, was only a variety or modification of small-pox.

Dr. Hennen in his paper on eruptive diseases, thus expressed his belief in the efficacy of vaccination: "So perfectly convinced am I of the preventing and modifying powers of the vaccine inoculation, that I should never hesitate about employing it, even though it were probable that my patient had imbibed the small-pox infection. Nor should I be deterred from the practice by the idle supposition of the nurse that I was too late, or the learned objection of the doctor that the two diseases could not co-exist; *experience very clearly demonstrating, that there is still something in the mutual relations of these diseases to each other that has not yet been satisfactorily elucidated.*

"After the most mature deliberation, I most explicitly avow, that nothing has occurred in these cases which has in the smallest degree shaken my opinion of the great and pre-eminent importance of the practice of vaccination; whether we view it as a preventive of small-pox in a vast majority of cases, or as a most effectual neutralizer of its malignity in the comparatively few instances in which from some peculiarity of constitution, or some anomaly in the process hitherto but fully developed, it has failed to afford this permanent security."

There can be no doubt that during the first years of vaccine inoculation there had been great carelessness and inattention in conducting the practice. And in 1818, there were numerous complaints of the bad quality of the vaccine lymph. Dr. Jenner received hints of this kind from Italy, from America, and many parts of England.

The greatly exaggerated statements on this subject of the vaccine failures, and the hesitating manner in which many respectable physicians spoke on the subject, threatened to lead to a considerable abandonment of this practice.

Under these circumstances Sir Gilbert Blane rendered distinguished services to the cause of vaccination, by proving by the most conclusive reasoning, and an appeal to the most authentic documents, that the importance of the vaccine discovery was not in the most essential points lowered by the failures which were alleged to have taken place. In order to bring this matter to the test of calculation Sir Gilbert Blane, selected from periods, each of fifteen years, for the purpose of exhibiting the comparative mortality of small-pox. The last series comprehended the time in which the vaccine inoculation had been so far diffused as to produce a notable effect in the deaths from this disease. The result of the whole was, that even under the very imperfect practice of vaccinnation which had taken place in London, 23,134 lives had been saved in the fifteen years alluded to, that is from 1804 to 1818 inclusive.

INVESTIGATIONS OF DR. ALEXANDER MONRO ON SMALL-POX AND VACCINATION.

Dr. Alexander Monro, Professor of Anatomy and Surgery in the University of Edinburg, in his "observations on the different kinds of small-pox, and especially on that which sometimes follows vaccination," published in 1818, states in the introduction, p. 24, with reference to the disease in Scotland:

"All the cases of small-pox which have lately occurred have been imputed to the inefficiency of the cow-pox; whereas I have ascertained upon grounds perfectly satisfactory to myself, that a few only have originated from that cause, as in a great majority of the instances of small-pox now to be observed among the lower orders of society, vaccination had never been performed, and in others it had been imperfect.

"It ought not to be forgotten, that in the first instance at least, Dr. Jenner's discovery appeared, in one important respect, to be rather incomplete; it did not furnish the inexperienced eye, a certain means of distinguishing whether the disease be genuine or not, and also whether the constitution of the patient had been actually subjected to the influence of the cow-pox—a great desideratum. That desideratum was still required, I mean *a test for distinguishing whether or not the influence of the cow-pox has been constitutional or only local*. This was supplied by the ingenuity of Mr. Bryce, who discovered, that by re-inoculating on the fifth day on the other arm, the pimples on both arms follow exactly the same course, and arrive at maturity at the same time if the disorder has been constitutional; and this is what I understand by *perfect vaccination*.

"But though it cannot be denied that vaccination has failed to give perfect security against the small-pox, yet in the cases where it has failed to do so it has modified and mitigated that loathsome and dangerous disorder in a most remarkable manner, so that the small-pox after cow-pox can scarcely be said to form one of the class of mortal diseases. P. 24-25.

Dr. Alexander Monro communicates the following as the chief causes which had led to the failure of the vaccine inoculation.

"1. The matter for inoculation has sometimes been taken from a spurious sore, which, though it occasioned a vesicle, and excited inflammation in the inoculated patient, did not communicate the genuine disease, or it has been taken from the true sore at too late a stage of its progress: and hence, though it occasioned accute inflammation, it did not communicate the true cow-pox.

"2. If the lancet on which the matter of small-pox is present shall become rusty, the rust of the steel decomposes the poison.

"3. If the vaccine vesicle has been repeatedly punctured or drained for two or three successive days, the inoculation generally fails; for the poison which, in the progress of the disease, is depositing in the cells of the vesicle, is thus exhausted, or may be so much diluted as to be incapable of producing the disease.

"4. The matter taken from the genuine cow-pox vesicle may be injured by heat, exposure to the air, or moisture.

"5. If the matter be taken from the cow-pox vesicle after the thirteenth day, it 'does not,' according to Willan, 'produce the genuine cellular vesicle, but is in some cases wholly inefficient, while in others it suddenly excites a pustule or ulceration; in others a regular vesicle, and in others erysipelas.'

"6. If the crusts employed for cow-pox inoculation be kept in a high temperature, or in a damp place, they soon acquire, as Mr. Bryce has well observed, a peculiar smell, which marks their loss of power to reproduce the cow-pox.

"7. The inoculation for cow-pox does not take effect when the child labors under other cutaneous disorders, as measles, scarlatina, itch, herpes, tenia capitis, or cruita lacta."

"Imperfect vaccination," says Dr. Willan, "is not characterized by any uniform sign or criterion, but exhibits in different cases very different appearances, as pustules, ulcerations, or vesicles of an irregular form. The vaccine pustule is conoidal; it increases rapidly from the second to the fifth or sixth day, being raised on a hard, inflamed base, with diffuse redness, extending beyond it on the skin. It is usually broken before the end of the sixth day, and is soon after succeeded by an irregular yellowish-brown scab. The redness disappears within a day or two, and the tumor gradually subsides."

According to Dr. Jenner, "the commencement is marked by a troublesome itching, and it throws out a premature efflorescence, sometimes extensive, but seldom circumscribed, or of so vivid a tint as that which surrounds the pustule (vesicle) completely organized, and (which is now characteristic of its degeneracy than the other symptoms) it appears more like a common festering produced by a thorn, or any other small extraneous body sticking in the skin, than a pustule (visicle) excited by any vaccine virus. It is generally of a straw color, ond when punctured, instead of the colorless transparent fluid of the perfect vesicle, its contents are found to be opaque."

According to Dr. Alexander Monro, "when the vesicles are irregular or imperfect, there is commonly premature itching, which is so great as to promote scratching, inflammation and the formation of matter.

"The progress of the vesicle is too rapid, its texture is soft, and it is apt to be broken; the border is not well defined, the middle is raised, and the contents discolored or purulent, and it is encircled by a premature efflorescence of a dirty purple hue, and the scab is of an ambre color.

"It has been mentioned by Messrs. Dawson and Kate (Transactions of College of Physicians, vol. 3) that the part into which the variolous poison has been inserted, inflames, and a pustule is produced, which is filled by an active variolous poison, capable of exciting the disease in others, without the person himself being constitutionally affected by small-pox, *or being by this pustule on his body* rendered unsusceptible of variolous contagion at a future period of his life. The same has been observed by several others, and this may undoubtedly happen in cow-pox as well as in the small-pox inoculation, and thus form a fruitful source of disappointment in conducting vaccination.

"All of these difficulties have been removed by the ingenuity of Mr. Bryce, who has supplied us with a certain test for determining these important points, which consist in reinoculating the child on the other arm on the fifth day after the first inoculation. If the constitution has been affected, the vesicles on both arms arrive equally soon at maturity, and also fade together. The arguments advanced in favor of Mr. Bryce's test are founded on the most vigorous investigation, and in my mind amount to a complete demonstration of its importance, and have been confirmed both by the testimony of experience and of public opinion. My father, in his lectures, used always to express his utmost confidence in Mr. Bryce's test as a mark that the constitution has been affected, and also his opinion that its ingenious author merited a public reward, he considered Dr. Jenner's discovery to be incomplete."—*Observations on the Different Kinds of Small-pox*, and especially on that which sometimes follows vaccination; illustrated by a number of cases. By Alexander Monro, M. D., F. R. S. E., Professor of Anatomy and Surgery in the University of Edinburgh, Fellow of the Royal College of Physicians, Etc., Edinburgh, 1818; pp. 108-113.

The following account of the TEST OF MR. BRYCE, *for Successful Vaccination*, is given in the author's own words, and it is worthy of consideration, not merely on theoretical grounds in connection with the history of cow-pox inoculation, but more especially at the present time, when vaccination is too often performed in a careless manner, or when hostility to the measure appears to have received a new impetus.

MR. BRYCE'S TEST.

"I am thoroughly convinced that some clear and well defined mark of a constitutional affection in cow-pox, different from what has hitherto been observed by those who have written on the subject, is still to be regarded as the grand desideratum in conducting this new inoculation; for, until this be established, our judgment of the efficacy of the cow-pox inoculation in preventing small-pox, must often be formed with doubt and anxiety, and too frequently prove ultimately erroneous. The truth of these remarks will be best known to those mostly conversant with the cow-pox inoculation, and who are accustomed to observe the great variety of appearances which the affection at the part inoculated often assumes.

"For some time after the introduction of the cow-pox inoculation into medical practice, many cases were related in which an eruption of pustules, more or less numerous, was said to take place, similar to what happens in small-pox. While these reports were propagated, and certified by men who seemed worthy of credit, even although no instance of the period had come under my own observation, I entertained hopes of so conducting the new inoculation in every case as to obtain a certain and well-defined mark of a constitutional affection; for, if an eruption of pustules belonged to cow-pox in any case, as a consequence of the peculiar fever or constitutional ailment thereby induced, I thought that one or two pustules might be made to appear in every case. It is well known that by irritating any part of the skin, by the application of heat, or a stimulating plaster, or various other substances, we can produce a greater number of pustules of small-pox upon that particular part than would otherwise have appeared; and judging from analogy, I expected that the same theory might have been affected on cow-pox. Such trials I have made; and although they were conducted with as much anxiety and care to produce pustules as other persons seem to have taken to avoid producing them, yet they have constantly failed; nay, these trials have now been made under such a variety of circumstances without effect as to confirm me in the opinion, that an eruption of pustules, as a consequence of a constitutional affection, does not belong to the cow-pox.

"Foiled in my attempts so to conduct the inoculation of cow-pox as to produce pustules, I recollected some experiments which had been made with regard to the inoculation of small-pox. It was found that if the same person was inoculated every day until the fever induced by the first inoculation supervened, all the other punctures quickly advanced in their progress; and that, in the course of a day from the time the fever or general affection began, even that puncture which had been last made, perhaps only twenty-four hours before, and from which the fever had arisen.

"In this case, it appears to me evident, and I think must be admitted by every person, that even had no other pustules appeared on the body than those occasioned by the

> repeated inoculations, nay, had there even been no fever observed in consequence of the inoculation, yet as the pustule occasioned by the last puncture, had been suddenly accelerated in its progress to maturation, at the time the general or constitutional affection should have appeared, this alone was a sufficient proof of the presence of the variolous action in the system.
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> "Judging again from analogy, I expected that the same thing, which thus happened in the small-pox inoculation, might also take place in that for the cow-pox; and the unexpected appearance of one or two vesicles upon children that I had inoculated, which vesicles were quite characteristic of the ailments, and the appearance of which I could only account for from a second and accidental inoculation during the course of the disease, strengthened my hopes. And certainly, if we find in cow-pox, when the inflamed and hard areola does not take place, at least in the regular course of that affection, until the end of the seventh or beginning of the eighth day from inoculation, performed for example at the end of the fifth or beginning of the sixth day, is so much accelerated in its progress, about the time the general affection of the system usually takes place, as to have an areola formed within a few hours, or very shortly after the first, and that this areola increases with the first, and again fades at nearly the same time, we must be struck with the similarity, and be forcibly led to draw the same conclusion in this case as in the former, respecting the small-pox, viz: that although the inoculated affection had appeared very slight, and no fever had been observed, yet that a certain action had been excited in the constitution. That this was the true constitutional affection of cow-pox, may be judged by the acceleration of the second vesicle to a state of maturity, five days before this could have happened, had there been no consentaneous general action or change in the system.
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> "The truth of this opinion was also soon put to the test of experience; and I have now much satisfaction in declaring that the result appears to answer my most sanguine expectations.
>
> "In short, my observations on this point lead me to conclude, that, in order to obtain the proposed criterion in the greatest perfection, the second inoculation should be performed between thirty-six and forty-eight hours before the areola of the first inoculation begins to appear. This is necessary, in order that the secondary affection may have proceeded some length, and that a small vesicle containing virus may have been formed by it, before the constitutional action from the first inoculation begins, otherwise no areola but merely a slight degree of hardness will take place from the second puncture.
>
> "As, on the one hand, the acceleration of the second inoculation in the manner above mentioned is to be regarded as a certain mark of a constitutional affection in cow-pox, so, on the other, if it shall be found that no such acceleration takes place, but that the second inoculation proceeds by a slow progress through all the stages, and has the duration of a primary affection, it is to be concluded that no constitutional action has taken place from the first insertion of the virus, and when this is the case, the second inoculation must be regarded as a primary affection, and a third puncture be made according to the plan laid down for conducting the second inoculation; and thus we may go on until the proper tests be obtained, or until we be satisfied that the constitution completely resists the action of cow-pox."

The directors of the cow-pox institution of Dublin, in their annual report for 1817, professed themselves utterly incredulous of danger from the small-pox, after vaccination, conducted with due attention, to TESTING ACCORDING TO MR. BRYCE'S PLAN (when practicable,) to the formation of the areola, and of the scabbing process from the twelfth to the thirteenth or fourteenth day on an average: they had reason to believe that many practitioners were not sufficiently attentive to the formation of the areola and scab.

The test of Mr. Bryce had met with the approbation of Dr. Jenner as early as the year 1803. Thus in a letter to Mr. Bryce, dated April 5, 1803, Dr. Jenner says:

> "I must admire your precaution in using a test of the certainty of infection; and your ingenuity in the manner in which you employ it. On all young vaccinators it cannot be too strongly enjoined. The *experienced* will determine from the character of the pustule. The evidence before the House of Commons evinces the propriety of your observations.
>
> "I put your crust into the hands of my friend Ring, and he informed me yesterday that it had produced a good pustule. Experience now tells us this is a good mode of sending the vaccine virus to distant parts."

OPINION OF THE MEDICAL PROFESSION IN 1818, AS TO THE PROTECTIVE POWER OF VACCINATION AGAINST THE SMALL-POX.

The public and professional mind was much agitated by the appearance of an eruptive disease resembling small-pox, and apparently produced by small-pox infection, in many persons who had been formerly vaccinated, during the years 1817 and 1818, and the following questions were seriously propounded in less than a quarter of a century after the promulgation of the Inquiry of Edward Jenner on the variolæ vaccinæ:

1. In what proportion do failures occur in vaccination?

How many cases of small-pox or varioloid occur in any given number of vaccinated persons exposed to the variolons poison?

2. To what is it owing that vaccination proves a preventive against small-pox in some cases, and fails in others? Is it owing to the constitution of the individual? Is it owing to the vaccine virus with which they are inoculated? Is it owing to the manner of vaccination? Is it owing to the progress and treatment of the cow-pox?

3. Has the vaccine virus frequently deteriorated, from the employment of lymph in succession, from vesicles which had not gone through the stages with perfect regularity? Has the imperfect vaccine vesicle thus produced the power of rendering the human frame susceptible of none but the mitigated form of small-pox?

Is it true, that by improper treatment, by accident, or by puncturing the vaccine vesicle too freely, enough of the virus to affect and secure the constitution will not be left to be absorbed?

4. How does the degree of protection differ? Is it absolute in any case? Are there cases in which it is capable of resisting the most powerful application of the variolous virus, while others are susceptible of its slightest application? or, do the degrees of protection pass insensibly into each other, from the highest to the lowest?

5. Does the protection originally given gradually wear out as to susceptibility of infection?

6. Does the protection originally given, gradually wear out as to the power of modifying subsequent small-pox, or does it originally differ in degree?

7. In what respect do the powers of vaccination, in modifying subsequent small-pox, differ from those of natural and of modified small-pox?

The belief of the careful observers in the Medical Profession, in 1818, in reference to the preceding queries may be thus formulated.

(*a*). Vaccination seems to afford permanent protection against small-pox infection in a large proportion of cases.

(*b*). In some instances it only affords imperfect protection; or there are instances in which from variolous infection a modified small-pox is produced.

(*c*). In some instances it seems to afford only temporary protection; or there are persons, who, after having repeatedly been exposed to variolous infection, are at last inflicted by it, and pass through the disease in a modified form.

(*d*). In the small-pox modified by previous vaccination, the eruptive fever is often severe, the eruption sometimes numerous and general, in some cases even confluent, but the pustules are smaller, and dry up on the sixth and seventh days, without secondary fever.

(*e*). This modified small-pox is capable of infecting others, both by inoculation and naturally. It produces modified small-pox in persons previously imperfectly protected by vaccination, and regular small-pox in those who have neither been vaccinated nor had the small-pox.

(*f*). In some instances, persons who have previously had the small-pox, whether from inoculation or infection, have had a second attack of small-pox, similarly modified, from exposure to variolous infection or from variolous inoculation.

The constitutional disorder thus excited is generally more slight than a first attack of small-pox; but there have been recorded more instances of persons suffering severely, nay fatally, from what was considered to be a second attack of small-pox, after what has been considered perfect vaccination.

(*g*). There is no evidence to conclude that the virus of cow-pox is deteriorated by passing through, or being regenerated on a variety of human constitutions, provided it be taken from a regular vesicle at the period when most active.

(*h*). There is no evidence to conclude that the protecting influence imparted to the human constitution by perfect vaccination, diminishes by time, and ultimately leaves the constitution as susceptible of small-pox as before vaccination was performed. In some very rare instances, in which persons are said to have died from the attack of small-pox after cow-pox, this occurrence may be fairly attributed to some error in conducting the previous vaccination:

(*i*) The same general rule ought to be applied to the small-pox and to the cow-pox, with regard to their powers of protecting the constitution of those who have undergone their influence, against a future attack of small-pox.

(*j*). The advantages arising to society from propagating the cow-pox in place of the small-pox, are so many, and so conspicuous, as to admit of no hesitation in concluding that the former ought on every occasion to be encouraged, and the latter repressed, with the most effective measures and active exertions.

DR. THOMSON'S THEORY OF THE IDENTITY OF CHICKEN-POX, AND MODIFIED SMALL-POX.

In 1809 Mr. Brown of Musselburgh, published the opinion that the prophylactic virtue of the cow-pox diminished as the time from vaccination increased; and this view was strengthened, by the occurrence of many cases of a mild form of variola, in vaccinated persons, during the epidemic of small-pox of 1818 and 1819; and at this time the term modified small-pox was adopted. In addition to the work of Dr. Monro (published in 1818), on *"the different kinds of small-pox, and especially on that which sometimes follows vaccination,"* an analysis of which has been presented, Dr. John Thomson, of Edinburgh, published "some observations on the varioloid disease which has lately prevailed in Edinburgh, and on the identity of chicken-pox and *modified* small-pox," in a letter addressed to Dr. Duncan, Jr. dated fifteenth

September, 1818, (Edinburgh Medical, Surgical Journal No. L., 6). Dr Thomson reproduced this paper in his "*Account of the Variolous Epidemic which has lately prevailed in Edinburgh and other parts of Scotland,*" etc., published in 1820.

The following is a brief statement of the conclusions of Dr. John Thomson of Edinburgh as detailed at length in the preceeding publication :

1st. The varieties which appeared in the epidemic of 1818 convinced Dr. Thomson, that the descriptions which had been given of the appearance and progress of the eruption in small-pox by the best systematic authors are in many respects imperfect; that the diagnostic marks which have been pointed out between small-pox and the disease that has been termed chick-pox, are not to be relied upon; and that no appreciable marks of distinction between modified small pox and chicken-pox have hitherto been established.

2. It appears from the records of medicine, that the same person may have small-pox twice or oftener during life.

3. It has been incontrovertibly established by Dr. Jenner and his followers, that cow pox has the property of rendering those who have passed through it much less susceptible of small-pox infection than they were before; and besides this, that it possesses also the invaluable property of modifying the small-pox in those who receive them, and of converting them, from the most fatal of all diseases, to one scarcely, if at all, fatal.

4. By admitting that small-pox possesses this modifying property, it follows, that, in the instances in which they exerted this influence, previously to the discovery of cow-pock, they must have produced a mild or less fatal species of small-pox, but a species which has not been recognized or pointed out as differing from natural small-pox. It seems, therefore, probable, that this secondary small-pox, must have formed a considerable portion of the varioloid eruptions that were formerly denominated the spurious small-pox, and afterwards by some the chicken-pox.

5. After Dr. Heberden had distinguished chicken-pox from small-pox, and had convinced himself and the medical world, that these diseases arose from two contagious poisons, specifically distinct from each other, it seems probable that the cases of modified secondary small-pox which may have occurred, must have been described as cases of chicken-pox, since we nowhere find any hint of the possible co-existence of these two diseases, or the danger in which medical practitioners are of confounding them together.

"Can it be that the hypothesis of the contagion of chicken-pox being specifically different from that of small-pox, has been had recourse to, in order to explain those cases of secondary small-pox which may have occurred after variolous inoculation, and in the benevolent wish of vindicating that practice from the suspicion of being inefficacious?"

Dr. Thomson regarded the epidemical disease in Edinburgh as the same with those varioloid diseases which, since the introduction of cow-pox inoculation, had been observed in England, Scotland and other countries, and which have been by some medical practitioners regarded as small-pox, and by others as chicken-pox. Appendix, pp. 1–11.

ESTABLISHMENT OF REVACINATION.

Small-pox was epidemic in France in 1826 and 1827, and in the northern part of Italy in 1827; and in consequence of the numbers of those vaccinated who had been attacked by small-pox more or less modified or unmodified, the practice of REVACCINATION commenced in Prussia, and the German States, and was subsequently encouraged by their governments.

In 1832-4 small-pox prevailed epidemically in Ceylon, when a considerable number of those vaccinated died; and it made great devastations in Hindoostan on several occasions, both prior and subsequently to this date, and many of those vaccinated were carried off with it. Dr. Gregory states that the admissions into the Small-pox Hospital in 1838, more than doubled the average number received annually, prior to the discovery of vaccination, and that two-fifths of the admissions consisted of persons who had been vaccinated. Many of them had the disease severely and more than twenty of the number died.

Some of the earliest, and at the same time most conclusive testimony in favor of REVACCINATION, was furnished by its results in the Wurtemberg, Hanoverian, Bavarian, and especially in the Prussian armies.

REVACCINATION was first commenced systematically in the Prussian armies in the year 1833, after having been practiced in the Wurtemberg army and among smaller bodies of men for several years previously, and recommended by several leading practitioners, and has been continued in that and several other armies, and also among large bodies, of citizens.

The following have been recorded as the results of revaccination:

In Wurtemberg but one case of variolæ occurred in five years among 14,384 revaccinated soldiers, and three only among 26,864 revaccinated civilians.

Not a single case of small-pox occurred among those who had been revaccinated in the Prussian army in 1836, 1837, or 1839.

But three deaths by this disease occurred in all the military hospitals of Prussia in 1841, and of these, one was in a person not vaccinated on entering the army, because it had been done shortly before; a second in a recruit who had not been revaccinated; and the third in an officer who had been revaccinated some years before, but without success.

In 1834 two deaths are recorded of those who had been revaccinated with effect in the Prussian army, and one in 1843. In 1849 but one case was fatal, and this was in a recruit vaccinated when a child, and who had not yet been revaccinated.

During an epidemic of small-pox in Copenhagen, in 1828 to 1832, and another in 1835, but a single case of variolous or varioloid disease was observed among any who had been revaccinated.

In the Danish army, of those who were successfully revaccinated in 1838, not one was attacked with small-pox.

In an epidemic of variola at Heidelburgh, in 1843 and 1844, described by Dr. Hœfle, of all those attacked not a single one had been previously revaccinated, while the vaccinations most successfully made did not protect from the most severe varioloid those older than ten years.

Steinbrenner, as the result of extensive investigation of the subject says, "Revaccination is the indispensable complement of the first vaccination, not that it is always necessary, as some pretend who admit the loss of its protective power by time, but because it is necessary in very many cases, and because there is no other means of distinguishing such urgent cases from those in which revaccination is unnecessary." (Traité sur la Vaccine, p. 684.)

Steinbrenner derives his arguments in favor of revaccination from its effects in the different European armies, as well as when performed by various individuals on a small scale, of which he presents a long array; and says that in the absence of every other argument, those results are strongly in its favor, because it is impossible that the process should be so often successful unless the success depended upon a predisposition which exposed the individuals to variola.

M. Bosquet says, after giving a long list of instances of protection by revaccination without a failure, even in the midst of epidemics, "There has not been an epidemic which has not proved at the same time the virtues both of vaccination and revaccination. The success of revaccination is at the same time the effect and the proof of the wants of the system. When it succeeds, it not only proves that the protective power of vaccination is diminished, but it supplies a remedy for this diminution." (Nouveau Traité à la Vaccine, Paris, 1848, p. 506.)

The following are the conclusions on this subject of the Committee on Vaccination, of the French Academy, as contained in their report to this body in February, 1845:

1. Small-pox rarely attacks those who have been vaccinated before the age of ten or twelve, from which age, until thirty or thirty-five, they are particularly liable to small-pox.
2. Re-vaccination is the only known method of distinguishing those vaccinated persons that remain protected from those that do not.
3. The success of re-vaccination is not a certain proof that the person in whom it succeeds was liable to contract small-pox; it merely establishes a tolerably strong presumption, that he was more or less liable to take it.
4. In ordinary periods, re vaccination should be practiced after fourteen years, but sooner during an epidemic.

The following are among the conclusions of a report on the subject of vaccination made by a committee to the Belgian Academy of Medicine.

As the immunity conferred by vaccination is not indefinitely absolute, re-vaccination, at least for a great number of individuals is rationally vindicated.

Experience has proved that a recent re-vaccination preserves from variola and varioloid, and that practiced on a sufficient scale, conjointly with vaccination, it constitutes a sure means of arresting the progress of this malady when it appears epidemically.

It succeeds but in proportion as it is most required, that is, the more remote the period since the individual had variola, or has been vaccinated.

During the prevalence of an epidemic of variola or varioloid, it is prudent to re-vaccinate all those whose first vaccination dates ten years back, and all those whose first vaccination gives rise to any doubts. (Brit & For, Md. Chir. Rev., January, 1851.)

PROFESSIONAL VIEWS HELD IN 1839, AS TO CORRECT VACCINATION AND IMPEDIMENTS THERETO.

In the able "Report of the section appointed to inquire into the present state of vaccination," read at the Anniversary Meeting of the Provincial Medical and Surgical Association, held at Liverpool, July 25, 1839; the Reporter observes on the discrepancy that obtains in the statements and ideas of medical men upon the protective influence of vaccination:

1. The only perfect test is the insertion of variolous lymph. This, however, is obviously objectionable.
2. The regular progress of the vaccine vesicle. To determine this, the surgeon should note it at proper periods. The genuine disease can only be produced by pure lymph from a regular source. The time for taking this lymph, according to Dr. Jenner, is between the fifth and eighth days,

and before the formation of the areola. Others have recommended the use of the lymph taken at a much latter period, but this they believe to be a very questionable practice.

3. Jenner proposed that some fresh vaccine lymph should be inserted into the patient after the first vaccination. This practice was founded on the observation that the second vaccination proceeds with accelerated speed, provided the first has taken effect. It is a very simple and beautiful illustration of the constitutional effects of vaccination and deserves to be encouraged. An experienced eye will for the most part be able to detect any deviation from the true vesicle.

4. The character of the lymph employed; it never ought to be taken from a vesicle which deviates in the least degree from the perfect standard, or from a patient laboring under any cutaneous disease.

5. A point which ought ever to be insisted upon, is the leaving one or more vesicles to run their course without being in any way disturded.

6. The appearance of the cicatrix; the reporters think that this has been too much trusted, They are inclined to believe that though the presence of a perfect cicatrix is not a sure sign of protection, its absence must be held to speak strongly against the existence of vaccine influence. Yet the observation of Mr. Dodd would seem not to bear out this impression. Of fifty.seven cases that have been exposed to the contagion of small-pox and escaped, in six only was the cicatrix perfect; in fourteen it was slightly defective; in thirty it was very imperfect; and in seven it was totally wanting. Out of seventy-seven cases of small-pox after vaccination, one bore a perfect mark, fourteen had the cicatrix slightly defective, forty-seven were imperfect, and fifteen had none at all. Thus, to sum up the whole, out of one hundred and thirty-four cases of vaccinated persons who had been exposed to small-pox, the cicatrices of seven were perfect, and one of these failed; twenty-eight slightly defective, of which fourteen failed; seventy-seven very imperfect, forty-seven of which failed; twenty-two had no mark at all, and of them fifteen had small-pox, while seven altogether escaped.

7. Vaccine lymph, though passed through a great number of subjects, and used for a great number of years, does not necessarily become deteriorated. This, however, can only be said when unceasing attention is paid to every successive transmission; for if a deviation commences, it may be perpetuated, and afford a gradually decreasing protection. There is no doubt that lymph of this kind have been often used.

8. The influence of cutaneous diseases on the vaccine vesicle has been insufficiently attended to. Dr. Jenner pointed out that the affection was very much modified in its progress by the scaly tetter, and those affections described by Dr. Willan under the term *psoriasis*, as well as those vesicular eruptions commonly called herpetic. He observes that vaccination performed on a skin occupied by any of these diseases, "produces every gradation from that slight deviation from perfection, which is quite immaterial, up to that point which affords no security at all."

9. Other constitutional peculiarities stand in the way both of human small-pox and cow-pox. Some resist these affections at one period of their lives and not at another; and there are examples of the very opposite condition, which show that the individual will receive either infection as often as it is presented to him These peculiarities frequently run in families. We know several children of the same parents who have had morbific small-pox after cow-pox; and not many months ago three brothers had small-pox after cwo-pox, one of these cases proving fatal. On this sub-

ject we have illustrations from Mr. Dodd, who tells us that six brothers and sisters in one family having been vaccinated when children, had the small-pox a few years afterwards.

In another instance, two sisters vaccinated in infancy, were subsebuently inoculated and had the small-pox slightly, they both had it again in 1837, and one of them had it very severely. Their father caught the small-pox; their mother too, who was inoculated when young, had it again in the same year; their maternal grandfather, beholding from a window at night, the funeral of a friend who had died of small-pox, sickened of that disease and died. There are a few of the affinities and concordances between human small-pox and cow small-pox; and we doubt not that every subsequent observation will establish the analogies. In confirmation we further remark, that the great object of inoculation with human small-pox, was to produce an affection as much like that of cow-pox as possible, and by great care in selecting the virus to be employed this was sometimes accomplished in a very remarkable degree. On the other hand, it is known that the disease, when casually caught from the horse or cow, is often a severe one—as severe, it was said by an experienced observer, as for the most part was inoculated small pox. We ourselves have seen it, when caught from the horses, exhibiting great intensity, the hands and arms being covered with the eruption."—*Transactions of the Provincial Medical and Surgical Association Instituted* 1832, *Vol.* 8., *p.* 39. *Medico Chirurgical Review*, *Oct.*, *Vol.* 37, 1840.

ON THE COMPARATIVE ADVANTAGES OF THE INOCULATED SMALL-POX AND OF THE COW-POX—HISTORY OF SMALL-POX INOCULATION—MORTALITY OCCASIONED BY NATURAL SMALL-POX, INOCULATED SMALL AND COW-POX—STATISTICS ILLUSTRATING THE GREAT BENEFITS CONFERRED ON THE HUMAN RACE BY VACCINATION.

HISTORY OF SMALL-POX BY INOCULATION.

The Roman Empire was finally overturned by the Northern Barbarians in the sixth century of the Christian era; from that event literature and art lay for many centuries afterward buried in the ashes of Rome. The crash of this immense colossus was soon succeeded by another memorable catastrophe; the Arabians, in 622, under Mahomet, sallied forth from the East, sword in hand, to propagate his religion, and with rapidity subdued several great kingdoms and princes in the West.

Three new diseases, the small-pox, the measles, and the spina ventosa, were first described by the Arabians. The two former diseases had never before been seen in any part of the globe frequented by Europeans; at least no history of them has been found in any ancient medical author, poet or historian of either Greece or Rome. Mahomet's followers are said to have exported these two specific poisons from the deserts of Arabia. Variolous poison was soon spread by the Mahomedans through Palestine, Syria, Egypt, Persia, Spain, and wherever they carried their victorious arms. Many centuries after, the Crusades, or Holy Wars, were instrumental in diffusing this exotic venom more widely over Europe.

The small-pox and measles, thus introduced by the Mahomedans, unpeopled more of Europe than all the fiercest wars or bloody exploits with which its annals are stained.

The exact time and place of the origin of the small-pox is shrouded in mystery; for it must be considered as a most extraordinary circumstance so contagious a disease, the poison of which adheres to clothes, linen, woolen, cotton and porous materials, during a long time, and has in this way been conveyed to very distant kingdoms, could have been circumscribed, and its ravages confined for several thousand years to a small corner of the globe, not divided by sea, from the rest of Asia.

Dr. Mead thinks that the small-pox was first generated in the hot climate of Ethiopia, and together with the plague, transported from thence across the narrow channel of the Red Sea into the opposite continent, Arabia; but if small-pox had been a disease anciently known in Ethiopia (which no one has proved) there were various opportunities for the infection being carried down the Nile into Nubia and the heart of Egypt, countries bordering on Ethiopia and of the remotest antiquity in arts and civilization, holding at various times commercial and military relations with the nations of Africa, Europe and Asia. The Romans in the height of their glory and after the conquest of Egypt, carried on a considerable trade with Arabia and India; one hundred and twenty vessels sailed annually down the Red Sea, traversed the Arabian coast, and arriving at the Malabar shores in India, and the Island of Ceylon, returned from thence loaded with cinnamon, pepper, ginger, silk, pearls and diamonds. Mecca, the birth place of the Mahomedan prophet, stands on the borders of the Red Sea. Throughout all this intercourse of great nations, variolous infection, seems not to have been dispersed amongst the great kingdoms, bordering on the Mediterranean, Red Sea, and Indian Ocean.

Mr. Holwell, who resided a great part of his life in India, published about the middle of the eighteenth century, a treatise on the practice of INOCULATION, and the treatment of INOCULATED SMALL-POX, in HINDOSTAN. Mr. Holwell states that it is believed in India, that Small-pox raged there time immemorial, and that the BRAHMINS or priests, time out of mind, have practiced INOCULATION. The Turks ascribe the origin of the practice to Circassia, formerly one of the Asiatic provinces of Turkey. It has been conjectured, therefore, that it is to India, that Europe is originally indebted for this important discovery through the medium of the Circassians.

Neither Rhazes, Avicenna, nor any of the Arabian physicians, who wrote in the ninth or tenth centuries, make the least mention of INOCULATION; had variolous poison been transported from India to Arabia, the physicians of the latter nation could not have remained ignorant of a practice, according to Indian tradition, so universal and ancient, and attended with such happy consequences.

INOCULATION IN INDIA is performed by a particular tribe of Brahmins, who were delegated annually for that purpose, and who made a tour or separate circuits in traveling parties to inoculate the distant provinces; arriving at the place of destination a few weeks before the return of the natural disease. The inhabitants who intend to have themselves or children inoculated, know the time of the Brahmin's arrival, and abstain according to established rules universally known, for one month before the inoculators' periodical visitation, from fish, milk, and a kind of butter *made of Buffalo's milk;* this is the invariable and only preparatoy regimen.

The Brahmins inoculate generally on the outside of the arm, the male about the middle, between the wrist and the elbow; the female between the elbow and shoulder. The operator first rubs the parts with a dry cloth, during eight or ten minutes; then with a small instrument made like a crow-quill, and sharp at the point, he makes in a small space, which might be covered with a silver six-pence, several slight scratches, so that the smallest appearence of blood may be perceptible; a pledget impregnated with variolous matter is then applied, after being wetted with a little water from the Ganges; over all a bandage is rolled; six hours after the bandage is removed, and the cotton left to fall off of its own accord.

VARIOLOUS MATTER, *taken from* INOCULATED SMALL POX, of *the preceding year is* generally used for *inoculation ; but is never received or preferred from natural small-pox, however mild and distinct.* There are many instances, says Mrs. Holwell, of the variolous matter entangled with cotton, and kept close stopped from the air in a bottle during five or six years, at the end of this period proving active.

The same careful regimen in diet is continued through the disease, as before inoculation. Every morning before sunrise, or every evening after sunset, the patients, from the first day after inoculation, are stripped naked, and sluiced over the head and body with buckets of cold water; in this manner the diurnal cold bathing is continued until the eruptive fever comes on, which by such means is rather hastened, and commences about the close of the sixth day. Then during a few days of the *eruptive fever,* they desist from cold bathing; bnt on the pustular eruption appearing on the surface, which is generally a process of three days, they again resume the cold water, and continue it to the end of the disease. The variolous pustules when ripe are all opened with a pointed thorn. Every pustule is considered as a small abscess, or boil, that has reached maturation, and whose matter should be drained off by an external opening.

About a dozen pustules are opened with great gentleness at one time, then the matter is absorbed with a linen or cotton rag dipped in warm water and milk; in this way they proceed gradually over the whole body, face and extremities. A cooling regimen is prescribed through the disease; the inoculated are forbidden to confine themselves to the houses, and are exposed very freely to the air and wind; all the fruits of the climate are permitted such as plantain, sugar cane and watermelons; and cold water, or rice gruel used for common drink. The number of pustules from inoculation in India, are generally fifty to one hundred.

Mr. Holwell affirmed that the process was mild and that almost all the inoculated recovered. This same authority has observed a malignant form of small-pox in India, which killed numbers so early as the second or third day, and which attacked turkeys, capons, fowls, poultry, parrots and other species of the feathered tribe.

From the testimony of the Missionary Jesuits, it appears that inoculation was practiced in Pekin, China, only from about the middle of the seventeenth century.

The CHINESE METHOD OF SMALL-POX INOCULATION, was to roll up in cotton a few of the dried scabs, which had fallen off from the variolous pustules, and which were kept ready for use in a bottle close stopped with wax; small pledgets of these were put up the nostrils; or the dried scabs were powdered and snifted up the nose; and in this way the vascular mucous membrane of the nose the artificial disease was communicated.

In 1724, when a virulent small-pox was raging in Tartary, the Emperor of China dispatched the physicians of his court to inoculate the Tartars.

There appears to be no such similarity in the Chinese or East Indian modes of inoculation, as to induce one to refer them to the same origin.

The earliest information in BRITAIN of inoculation, and of its utility in diminishing the mortality ot small-pox,was from Emanuel Timoni, a Greek physician, in a letter to Dr. Woodward, dated Constantinople, 1713.

In 1715, in another letter of Doctor Emanuel Timoni, to the Royal Society of London, he says that forty years before the above date, inoculation had been introduced into the capital of Turkey from two of the Asiatic provinces bordering on the Caspian Sea—Circassia and Georgia. An account of the Circassian practice may be found in Motraye's Travels to that country in 1712. Kennedy, another eye-witness of inoculation (Surgeon in the English Army), published in the same year with Timoni observations on the subject.

Pylarini's account of *Inoculation at Constantinople*, where he then practiced medicine, was published at Venice, 1715; in which year several thousand were inoculated in the Turkish capital. The Turks themselves, as Mahomedans and fatalists, rejected inoculation, and it was adopted only amongst the Greeks, Armenians and Christians. In Greece and the adjacent island of Candia it had been a practice during one or two centuries earlier. In Egypt, Tripoli, Tunis, Algiers, and other provinces of Africa subject to Turkey, inoculation had likewise been long known, and had extended so far south on the African Continent as the River Senegal.

It is stated that the Circassians and Georgians were induced to the practice of *Inoculation* by an additional and powerful motive to the security against small-pox, namely,—avarice, in order to preserve the beauty of their female children and to sell them at higher prices to the rich Turks and Persians as mistresses. The variolous matter they transferred by a small scratch made in different parts of the body, previously dipping the point of the needle into a ripe pustule, or in a nut-shell full of variolous infection. Many young women of Constantinople exercised the function of inoculators. Timoni says that they were indifferent whether the variolous infection was engrafted from natural or artificial pustules.

In 1717, the elegant and accomplished Lady Mary Wortley Montague, wife of the English Ambassador at Constantinople, had her son inoculated in that capital by Maitland, an English surgeon.

In 1725, Dr. Mead and Mr. Maitland made the experiment of Chinese inoculation upon one of seven condemned criminals in Newgate, and of the Turkish practice upon the other six; all of whom by that means obtained a pardon from the King, and recovered; but in the first case the brain was seriously affected, and a prejudice was engendered against the Chinese method.

In 1722, on Lady Montague's return to England, her young daughter was inoculated by a slight incision on each arm, and was the first person of any rank inoculated in that country. A few months after the Princess Royal and some other members of the Royal Family were inoculated.

1722. In this year inoculation was carried to Boston, Massachusetts, in North America, and was attended with the same favorable results as in London, in the handful who had the resolution to entrust their lives to that protection.

Dr. Jurin, from 1723 to 1727, published several detached papers in the Philosophical Transactions comparing the mortality of natural small-pox and the numbers lost by inoculation. From a great mass of materials, and many thousands of sick in different parts of Europe, he found that *one of five, or six, at* a medium, died by the natural disease; for, in its malignity, there is everywhere in different years various gradations, for in Turkey, in the northern parts of Europe, and in Africa, and throughout the whole extent of the Mediterranean coast, small-pox was still more fatal, and it has been in many outbreaks so violent as to kill nearly one-half of the infected.

Of those then inoculated, *one in fifty* died; but amongst them were included young infants, many of whom were cut off by convulsions, which was laid to inoculation, and some aged persons, pregnant women and valetudinarians. Jurin's list of all the inoculated in London and other parts of England, from 1721 to 1727, amounts to only seven hundred and sixty-four.

It is important to note in this connection, that in Wales a custom prevailed before the introduction of inoculation from Turkey, of engrafting the small-pox. A small wound or scratch was made on the hand or arm with a pin or a knife, and the variolous matter rubbed in; now and then the pocky scabs were merely rubbed in the hollow of the hands. A similar custom prevailed in some parts of Denmark in the fifteenth century, and is related by Bartholine.

Inoculation from 1727 languished in England and America until 1738, but *two* (2) died; in the same year, of *one thousand inoculated at all ages in one province of North America, namely, South Carolina*, and in the most unfavorable season, during the sultry heat of June, July and August, but eight (8) died.

Inoculation was first advocated in North America by the Reverend Cotton Mather, and was first practiced at his suggestion by Dr. Z. Boylston, on the twenty-seventh of June, 1721, in Boston, upon his only son, about thirteen years of age, and two negro servants, and was successful. During that year, or the early part of 1722, Dr. Boylston performed inoculation upon 247 persons.—*Thacher's American Medical Biography*, Boston, 1828, p. 28.

The havoc then made by small-pox, drove the inhabitants of Charleston, South Carolina, to adopt the only remaining remedy from destruction.

Middleton, in England, inoculated *eight* hundred and lost but one. Other inoculators lost one out of *three* and *four* hundred. In the West Indian Island, St. Kitts, of three hundred negroes inoculated, only one died. Ranby inoculated a thousand in England and without a single death. In 1746 a small charitable hospitable was erected at Pancras, in the environs of London, for the double purpose of inoculation, and to receive during the sickness, persons of indigent circumstances who had been siezed with natural small-pox; of *eighteen hundred and ninety-six* inoculated in this hospital in the course of several years, but *eight* died. At another period, of *four hundred and ninety-six* inoculated at this asylum, but *one died*.

In the year 1759, the number inoculated at *Pancras* were, *five hundred and ninety three* (593), and many of these adults, yet but *one died*.

The *Suttons* in the seventeenth century, by their own computation, inoculated throughout London, and many parts of England, about *forty thousand*, and they assert they did not lose *one hundred*.

In Pennsylvania and other provinces of North America, of 8000 inoculated, only 19 died, or one in 467.

In 1748, inoculation was introduced into Amsterdam by Dr. Tronchin, who began experiments upon his own son, and before 1759, inoculation had spread into several other towns of Holland.

In 1774, a malignant small-pox was committing severe ravages in the ecclesiastical state of Italy, and several mothers dreading the destruction of their whole families, inoculated their children, when sleeping, with the desired success.

The efforts of a few physicians and patriots of France to introduce the inoculation failed, from the ignorant and bigoted opposition of the clergy;* and from 1724 to 1752, no person in the medical profession of France wrote upon inoculation; in 1754, the public attention in this country was awakened by Mr. Condamine's papers read before the Academy of Sciences, in vindication of inoculation, and in 1755 and 1756, a few of the principal nobility were inoculated at Paris.

In 1755, Mr. Shultz returned to Stockholm from London, where he had been sent, by order of the Swedish Court, to inquire into the success and mode of inoculation, particularly at the London Inoculating Hospital; and in that year a small building for a similar purpose was erected at Stockholm. Of 1200 inoculated in Sweden before the year 1764, not one died. Denmark adopted the practice about the same time with Sweden.

MORTALITY OCCASIONED BY THE INOCULATED SMALL-POX.

According to the immature calculations of Turin, of those inoculated, *one* of *fifty*, and of Dr. Mead, *one* of *every hundred* died; but by the accounts of later date, collected by practical inoculators and physicians, on an average only *one* of *every five hundred* inoculated die, and it would seem from Mr. Holevill's statements, that this last rate of mortality would also apply to this practice in India.

In the London Small-Pox Hospital, of the last *five thousand* that were inoculated, only one in six hundred died.

THE PRACTICE OF INOCULATION FOR THE SMALL-POX, SUBSTITUTED A COMPARATIVELY MILD FORM OF THE DISEASE, ATTENDED WITH BUT SMALL MORTALITY; BUT THE TOTAL NUMBER OF DEATHS BY SMALL-POX WAS THEREBY INCREASED, AND THE PERPETUATION AND SPREAD OF THIS LOATHSOME PESTILENCE ON THE SURFACE OF THE EARTH, WAS PROMOTED BY INOCULATION.

Inoculation seldom or never fails to convey the disease; the pustules are in general few, and although only one or two should appear, the person is protected against the small-pox.

Exclusive of the immediate havoc by small-pox in the natural way, numbers who survive are disfigured for life; in multitudes of others, the natural disease is followed by phthisis and scrofula, and a considerable number are deprived of eye-sight.

Dr. W. Black* writing in 1781, says: "Others surmised, that infectious and hereditary diseases might be instituted together with variolous infection. Universal experience proves there to be chimerical conjectures, and in the natural disease there is greater danger of such imaginary combination of infections; for in chosing variolous matter it is easy to select it from healthy constitutions. Experiments have been made with variolous matter taken from persons laboring at the same time under the venereal disease, yet the latter affection was not engrafted with inoculated small-pox. The true scurvy, however virulent, every common seaman knows, is neither contagious nor infectious, neither is the scrofula."

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*Observations, Medical and Political, on the Small-pox, etc.: London, 1781, p. 41.

The London bills of mortality show that within one hundred years preceding 1780, in this city alone upwards of two hundred thousand people had been cut off by one single disease—small-pox. An examination of the London bills of mortality as far back as 1629, when the different diseases of those who died were first inserted, show that in all the interval extending to 1780, the deaths from small-pox in any one year did not exceed four thousand; in 1772, which yielded the heaviest mortality from this disease, they numbered 3992; and it was calculated that about two thousand inhabitants were annually destroyed in London by the small-pox. If in the eighteenth century, during the practice of inoculation and before the introduction of vaccination, the six hundred thousand inhabitants of London lost two thousand annually by small-pox, then throughout the *nine millions* in Britain and Ireland, *thirty* thousand annual deaths should be attributed to small-pox.

In the hundred years preceding the introduction of vaccination, during at least sixty of which inoculation was practiced, Britain and Ireland alone lost three millions of inhabitants by small-pox.

Baron Dimsdale, who was sent from England to inoculate the Czarina of Russia, in his treatise on small-pox, says that "*this single disease destroys more than the eighth part of the inhabitants.*

"If, therefore, in London, which enjoys the many advantages already recited, more than *two thousand persons die annually of small-pox*, we may surely suppose that the loss which Russia in its whole extent sustains in the *same space of time*, amounts to *two millions of souls.*" P. 16.

The learned Dr. W. Black, however, on more careful calculation, founded upon the best data accessible at that time (1780), estimating the total population of Europe at 120,000,000, taking Britain and Ireland as a body, "*the annual deaths by small-pox*, throughout all the kingdoms of Europe, will amount to only *four hundred thousand.*"*

During the practice of inoculation a question of great importance to mankind was agitated, namely, whether by inoculation in London and other great cities, at the private houses of the inhabitants, contagion is not more likely to be dispersed, and, upon the whole, the community at large more injured than benefited by the practice?

The arguments urged chiefly by Baron Dimsdale and other English writers, during the latter part of the eighteenth century, may thus be condensed.

Though the loss under inoculation is very inconsiderable, *almost the whole of those that are inoculated recovering*, yet by spreading the disease, a greater portion take it in the natural way; *more lives are now* (1725–1780) lost in London than *before inoculation commenced*, and the community at large sustains a greater loss; the practice, therefore, is more *detrimental* than *beneficial* to society.

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*Observations Medical and Political on the Small-pox, etc., 1781, p. 50.

In the four years preceding 1776, the number of bills from small-pox were at a medium to 2,444, an alarming increase.

The disease, by general inoculation throughout London, spreads by visitors, strangers, servants, washerwomen, doctors and inoculators; by means of hackney coaches, in which the sick are sent out to take the air, or by sound persons communicating with the sick in the streets.

The poor in London are miserably lodged; their habitations are in close alleys, courts, lanes and old dirty houses; they are often in want of medicines, even of bedding. The fathers and mothers are employed constantly in laborious occupations abroad, and cannot attend the inoculated sick; should they neglect their occupations, food and necessaries would be deficient, and the medicines and diet ordered by the physicians could not be regularly complied with. The air in their houses is impure, they have neither areas, gardens, or carriages for the convenience of ventilation and taking fresh air.

Sailors and sea-faring people, many of whose lodgings are miserable in the little houses on the river, are liable to catch the distemper, and either to fall sick there without friends or assistants; or, perhaps, being infected on shore, to carry it to sea in their contaminated clothes, and afterwards falling sick without care or attendance spread the disease in foreign climates.

Country people coming to town for markets, visits, or pleasure, all are subject to the danger of the infection.

Persons going from the sick to the General Inoculating Hospital, or Dispensories, for medicines or advice, scattered the disease in their infected clothing in the streets and whole neighborhood.

The gossiping disposition of the poor, the flocking of persons to funerals of those dead with the small-pox, and the sick sallying forth in the public ways in their dirty garments loaded with small-pox infection, scattered the disease broadcast. The children who were able to run about, immediately upon their recovery, still farther scattered the seeds of the fatal disease by intermingling in the streets and in the schools with their play-fellows.

The success, therefore, derived from general inoculation was beneficial to a comparatively few only; whilst it misled a great number of others in danger to which they would otherwise have been less exposed.

THE MORTUARY STATISTICS OF LONDON DEMONSTRATE THAT INOCULATION ACTUALLY INCREASED THE MORTALITY FROM SMALL-POX.

On the continent registers were instituted fifty or a hundred years before their introduction in England; but general annual registers of births, diseases and deaths are modern establishments, and were unknown to th ancients.

In 1538, exact records of weddings, christenings and burials, were fir ordered by the King and Council to be kept in every parish and chur in England by either the vicar or the curate. This order was very neg *gently* obeyed in many parishes, until 1759, in Queen Elizabeth's reig when to prevent registers from rotting in damp churches, they were directed to be written on parchment. At first, they seem, both in Germany and in England, to have been designed to prove the birth, death and descent of private persons, and the rights of inheritance in property or lands. In 1592, a year of pestilence, bills of mortality for London were instituted; but were discontinued till 1603, another year of desolating pestilence, which was the only distemper then taken notice of in the printed reports. In 1629, the different diseases, casualties of those who died, together with the distinction of sexes were added and published; and in 1728, and not sooner, the different ages of the dead were ordered to be specified in the London bills. Upon first establishing the distinction of diseases and casualties in the bills of the metropolis of England, the primary intention appears to have been to discern the numbers destroyed by the plague, and to detect concealed murders.

Since the days of Moses, however, existence has been circumscribed within the same narrow bounds. In the London bills of mortality, during a period of thirty years, that is, from 1728 to 1758, the total deaths amounted to 750,422, and of this number 242 only reached beyond 100 years of age; one of whom arrived at the age of 138.

Dr. W. Black* has recorded the following statistics illustrating the annual average births and burials recorded in London bills from 1671 to 1781:

LONDON BILLS AT A MEDIUM ANNUALLY.

YEARS.	Christenings.	Burials.
From 1671 to 1681	12,325	19,144
From 1681 to 1691	14.439	22,763
From 1691 to 1700	14,938	20,770
From 1700 to 1705	15,750	21,091
From 1706 to 1710	15,489	21,832
From 1711 to 1715	16,204	22,178
From 1716 to 1720	18,019	25;641
From 1721 to 1725	18,828	26,513
From 1726 to 1730	17,578	28,472
From 1731 to 1735	17,517	25,491
From 1736 to 1740	16,145	27,494
From 1741 to 1745	14.419	25,351
From 1746 to 1750	14,490	25,351
From 1751 to 1756	15,119	21,080
From 1759 to 1768	15,710	22,956
From 1770 to 1780	17,218	21 000

From the preceding table it appears that the mortality in London was great from 1617 to 1750, and comparatively low, considering the increase of population, from 1751 to 1780.

That this apparent improvement in the health and diminution in the mortality of London was not due to inoculation is conclusively shown by the following statistics:

Deaths from small-pox in London during fifteen years beginning from 1701 and ending with 1716, before the introduction of inoculation	22,219
Deaths from small-pox in London during fifteen years, 1717 to 1731, during and after the introduction of inoculation	34,448
Deaths from small-pox in London, fifteen years, 1732 to 1746, during inoculation	29,462
Deaths from small-pox in London, fifteen years, 1747 to 1761, during inoculation	29,165
Deaths from small-pox in London during fifteen years, 1762 to 1776, during inoculation	36,276

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*Observations, etc., on Small-pox, p. 158, p. 196.

During the preceding fifteen years before the introduction of inoculation' the deaths from small-pox reached only 22,216, whilst after its introduction in similar periods of time they ranged from 29,169 to 36,276, the highest number occurring in the last series of fifteen years.

THE ADVANTAGES OF COW-POX INOCULATION (VACCINATION) DEMONSTRATED BY OFFICIAL RECORDS AND STATISTICS.

In order to place this subject in a clear and impregnable position, we quote from official reports and records.

We extract the following from the valuable *Report of the House of Commons upon Dr. Jenner's Claim.*

"As a comparison between this new practice and the inoculated small-pox, forms a principal consideration in the present inquiry, some facts with regard to the latter engaged the attention of your committee; and they have inserted in the appendix statements of the mortality occasioned by the small-pox in forty-two years before inoculation was practiced in England, and from the forty-two years, from 1731 to 1772, the result of which appears to be an increase of deaths, amounting to seventeen in every 1,000, the general average giving seventy-two in every 1000 during the first forty-two years, and eighty-seven in the forty-two years ending with 1772, so as to make the whole excess of deaths in that latter period 1742. The increase of mortality is stated by another witness to be as ninety-five to seventy, comparing the concluding thirty years with the first thirty years of the last century, and the average annual mortality from small-pox to have been latterly about 2000; for although individual lives are certainly preserved, and it is true that a smaller loss happens in equal numbers who undergo the small-pox now than there was formerly, yet it must be admitted, that the general prevalence of inoculation tends to spread and multiply the disease itself; of which, though the violence be much abated by the modern mode of treatment, the contagious quality remains in full force. It deserves also to be noticed, that the deaths under the inoculated sort of small-pox, with all the improvements of modern experience, are not inconsiderable. It is stated by one of the witnesses at about one in every 300 throughout England; by another as about one in every 100 in London; while the loss in the natural small-pox is probably not less than one in six."

The following statement was subjoined to the Report of the House of Commons, illustrating the beneficial effects of vaccination.

"For this purpose we shall state the number of deaths by small-pox from the bills of mortality of parish clerks of London, during the twelve years since vaccination was introduced, viz., from January 1799, to January 1, 1811, and also during the twelve years immediately preceding the vaccine practice, viz., from January 1, 1787 to January 1, 1799. But in order to judge more accurately, we shall arrange the two periods of twelve years under three heads, each comprehending four years. This distribution affords the underwritten tables:

1. Deaths by Small-pox preceding vaccination in the first four years:			2. Deaths from Small-pox, during the Vaccine Practice in the first four years:		
1	In 1787	2418	1	In 1799	1111
2	In 1788	1101	2	In 1800	2409
3	In 1789	2077	3	In 1801	1401
4	In 1790	1617	4	In 1802	1579
	Total	7213		Total	6500

	Deaths from Small-pox in the second four years preceding Vaccination:			Deaths from Small-pox in the second four years after the institution of the Vaccine practice:	
1	In 1791	1747	1	In 1803	1202
2	In 1792	1568	2	In 1804	622
3	In 1793	2382	3	In 1805	1685
4	In 1794	1913	4	In 1806	1158
	Total	7610		Total	4667

	In the third four years:			In the third four years:	
1	In 1795	1040	1	In 1807	1297
2	In 1796	3548	2	In 1808	2257
3	In 1797	522	3	In 1809	1163
4	In 1798	2237	4	In 1810	1198
	Total	7347		Total	5915

The total number of deaths by Small-pox in 12 years previous to inoculation	22,170
Ditto, subsequent to vaccination	17,142
Decrease	5,028

From the preceding statistics it appears that the number of deaths from small-pox in the first twelve years exceed the number in the twelve succeeding years during vaccination by 5,028: or 419 persons *per annum* fewer for twelve years died since than before vaccination.

The progressive increase of the population during the period under observation should also be taken into the calculation. The absolute increase of the population of England from 1801 to 1811 was *one million, six thousand and fifty-four*, or about eleven in 100; or setting aside the increase of the army and navy, the population of England increased 14½ *per cent*, Wales and Scotland 13 *per cent.*

The following statistics, derived from authentic sources, illustrate in the clearest manner the power of vaccination and re-vaccination to prevent small-pox and to diminish the sum of disease, suffering, and death, and to promote the longevity of the human race

TABLE SHOWING THE COMPARATIVE MORTALITY FROM SMALL-POX IN LON- IN DECENNIAL PERIODS BEFORE THE DISCOVERY OF INOCULATION DURING THE PRACTICE OF INOCULATION, AND UNDER VACCINATION.

PERIODS.	Mean Annual Small-pox deaths. Per 1000.	Comparative Numbers.	
1650-1660	48	56	No protection.
1660-1670	36		
1670-1680	71		
1680-1690	74		
1690-1700	51		
1750-1760	100	96	Inoculation.
1760-1770	108		
1770-1780	98		
1780-1790	87		
1790-1800	88		
1810-1820	42	25	Vaccination.
1820-1830	32		
1830-1840	23		
1840-1850	18		
1850-1860	12		

*Parliamentary Return, 26th April, 1853. Vaccination, its Value and Alleged Dangers, etc., by Edward Ballard; London, 1868, pp. 273 to 691.

TABLE SHOWING THE ANNUAL DEATHS FROM ALL CAUSES AND FROM SMALL-POX IN LONDON FOR DECENNIAL PERIODS, FROM 1751 TO 1860. (1).

PERIODS.	Average All Causes.	Annnal Deaths Small-Pox.	Small-Pox Deaths per 1000 Deaths From All Causes.
1751-60	20,872	2.061	100
1761-60	23,202	2,445	108
1771-70	22,404	2,204	98
1781-90	19,516	1,705	87
1791-1800	20,213	1,780	88
1801-10	19,582	1,253	64
1811-20	18,604	793	42
1821-30	21,645	699	32
1831-40	24,585	573	23
1841-50	52,217	841	16
1851-60	61,047	715	11

TABLE SHOWING THE PROPORTION OF DEATHS FROM SMALL-POX IN PRAGUE, DURING SEVEN YEARS PRIOR TO THE INTRODUCTION OF VACCINATION, AND TWENTY-FOUR YEARS SUBSEQUENT TO THE INTRODUCTION OF VACCINATION. (2).

	Years 1792-1806, 7 Years Prior to Introduction of Vaccination.	Years 1832-1855, 24 years Subsequent to the Introduction of Vaccination
Proportion to Population of death generally	1 to 32	1 to 32½
Death from Small-pox to population	1 to 396⅜	1 to 14,741⅓
Deaths from Small-pox to total number of deaths	1 to 12⅓	1 to 457⅜

TABLE* SHOWING THE NUMBER OF DEATHS IN ENGLAND FROM EACH OF CERTAIN ZYMOTIC DISEASES IN EACH OF THE TWENTY-THREE YEARS FOR WHICH THE RECORD HAS BEEN MADE.

YEARS.	Scarlatina.	Diphtheria.	Measles.	Whooping Cough	Small-Pox	Fever.	Diarrhœa, Dysentery and Cholera.
1838	5802	....	6514	9107	16268	18775	3440
1839	10325	....	10937	8165	9131	15666	3493
1840	19816	....	9326	6132	10434	17177	4799
1841	14161	....	6894	8099	6368	14846	4198
1842	12807	....	8742	8091	2715	16201	7622
1847	14697	....	8690	9260	4227	30994	15630
1848	20502	....	6867	6862	6903	22037	15604
1849	13111	....	5464	9615	4645	18347	74155
1850	13370	....	7080	7770	4666	15375	14400
1851	13594	40	9370	7905	6997	17930	18045
1852	18813	74	5846	8022	7320	18641	21754
1853	15653	46	4894	11200	3151	18554	20502
1854	18325	203	9277	9770	2808	18893	42092
1855	17128	186	7354	10185	2525	16470	15044
1856	13931	229	7124	9225	2277	16182	15912
1857	13919	310	5969	10138	3936	19016	24037
1858	25481	4836	9271	11648	6460	17882	16004
1859	19907	9587	9548	8976	3848	15877	20597
1860	9681	5212	9557	8555	2749	13012	11185
1861	9077	4517	9055	12309	1320	15440	20999
1862	14834	4903	9800	12272	1628	18721	12667
1863	30475	6507	11349	11275	5964	18017	16801
1864	29700	5404	8323	8570	7684	20106	18368

Note (1).—Report of the Small-pox and Vaccination Committee of the Epidemiological Society, p. 41. Handbook of Vaccination, by Edward C. Seaton, M. D., Medical Inspector to the Privy Council, London, 1868, pp 422-424.

Noto (2).—Mr. Simon's Report and Papers relating to the History and Practice of Vaccination, 1857, p. 162.

Vaccination, etc., Edward Ballard, p. 378.

*Eighth Report of the Medical Officer of the Privy Council, 1865; presented pursuant to Act of Parliament; London, 136, p. 38.

TABLE SHOWING THE ANNUAL MORTALITY FROM SMALL-POX IN ENGLAND, WITH THE PROPORTION OF DEATHS TO POPULATION AND TOTAL MORTALITY, FROM 1838 TO 1865, INCLUSIVE.*

YEAR.	Population.	Deaths From All Causes.	Deaths From Small-pox.	Deaths from Small-pox per One Million of Population.	Deaths from Small-pox per 1000 Deaths from all Causes.	Place Occupied by Small-pox in the Order of Mortality in the Causes of Deaths in England.
1838	15,312,256	342,529	16,268	1,101	47.96	5th
1839	15,515,296	338,979	9,131	604	26.93	10th
1840	15,721,029	339,561	10,434	679	29.00	9th
1841	15,929,492	343,849	6.368	408	18.51	14th
1842 (1).........	16,123,793	349,519	2,715	172	7.76	25th
1847 (1).........	17,131,512	420,304	4,227	246	10.05	22d
1848	17,340,492	398,521	6,903	398	17.32	16th
1849	17,552,020	440,839	4,644	264	10.53	20th
1850	17,766,129	368,995	4,665	263	12 90	19th
1851	17.982.849	395,396	6,997	396	18.00	15th
1852	18.205,627	407,135	7,320	409	18.28	17th
1853	18,403.313	421,097	3,151	174	7.60	26th
1854	18,618,760	437,905	2,808	153	6 49	29th
1855	18,786,914	425,703	2,525	136	6.01	34th
1856	19,045,187	390,506	2,277	121	5.90	35th
1857	19.304,897	419,815	3,936	206	9.48	24th
1858	19,523,103	449,656	6,460	335	14 54	18th
1859	19,746,000	440,781	3,848	197	8.84	26th
1860	19,902,713	422,721	2,749	140	6.59	35th
1861	20.119,314	435,114	1,320	66	3.06	46th
1862	20,336.467	436,566	1,628	81	3.77	39th
1863	20,554,237	473,837	5,964	293	12.70	21st
1864	20,772,308	495,531	7,684	373	15.64	18th
1865	20,990,946	490,909	6.411	309	13.20	21st

Table showing the annual mortality from small-pox in England and in London at three periods, viz:

1. Before the enactment of any vaccination laws.
2. After vaccination was provided gratuitously.
3. Since vaccination has been made obligatory by statute.†

DEATHS FROM SMALL-POX IN ENGLAND.

1. Before the Enactment of any Vaccination Laws.		2. Vaccination Provided Gratuitously but not made Obligatory.		3. Vaccination to a Certain Extent made Obligatory.	
Years.	Deaths.	Years.	Deaths.	Years.	Deaths.
1838..................	16,268	1841	6,368	1854..................	2,808
1839..................	9,131	1842 (1)..................	2,715	1855..................	2,525
1840..................	10,434	1847 (2)..................	4,226	1856..................	2,277
		1848	6,903	1857..................	3,936
		1849..................	6,645	1858..................	6,460
		1850	6,666	1859	3,808
		1851	6,897	1860	2,749
		1852..................	7,320	1861	1.320
		1853..................	3,151	1862..................	1.628
				1863	5,964
Average annual deaths from Small-pox......	11,944		5.221		3,351

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* From Reports of Registrar General of England.

(1). From 1843 to 1846, inclusive, the causes of deaths were not analyzed by the Registrar General.—Hand-book of Vaccination; Edward C. Seaton, M. D.; p. 422.

† Registrar General's Report.

Analysis of Deaths from 1843 to 1846, inclusive, not given in Registrar Report on Vaccination; by Edward Ballard; p. 379.

DEATHS FROM SMALL-POX IN LONDON.

1. Before the Enactment of any Vaccination Laws.		2. Vaccination Provided Gratuitously, but not made Obligatory.		3. Vaccination to a Certain Extent made Obligatory.	
Years.	Deaths.	Years.	Deaths.	Years.	Deaths.
1838	3,817	1841	1,053	1854	694
1839	634	1842	360	1855	1,033
1840	1,235	1843	438	1856	531
		1844	1,804	1857	156
		1845	909	1858	242
		1846	257	1859	1,158
		1847	955	1860	898
		1848	1,617	1861	217
		1849	518	1862	345
		1850	498	1863	2,012
		1851	1,066	1864	537
		1852	1,159	1865	646
		1753	211	1866	1,388
Average annual deaths	1,859		826		758

The diminution of the deaths from small-pox in London, during the period specified (1838-1866, 29 years) took place in a constantly and rapidly increasing population. In the years 1840-41, the annual deaths from small-pox in the metropolis was 616, out of every million persons living, at all ages; from 1841 to 1850 there were in the mean population 389 per million; from 1851 to 1861, 272 per million.

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*Table Showing the Difference between the Mortality from Small-Pox in England and Ireland, during a Period in which there was no Law Compelling Vaccination, and that in Countries where Vaccination is More or Less Compulsory.**

Mortality in Various Places in England, Scotland and Ireland from Small-pox, as Compared with the Total Mortality for ten years, 1850–1851.		Mortality from Small-pox, in Various Countries in Which Vaccination is Directly or Indirectly Compelled, as Compared with the Total Mortality.	
PLACES.	Deaths from Small-pox per 1000. Deaths from All Causes.	PLACES.	Deaths from Small-pox per 1000 Deaths from All Cause.s
London	16.0	Westphalia	6.0
Birmingham	16.6	Saxony	8 33
Leeds	17.5	Renish Provinces	3.75
Paisley	18 0	Prussian Silesia	5.25
Edinburgh	19.4	Pomerania	7.75
Liverpool	21.0	All Prussia	7.5
Dundee	24.2	Lower Austria	6.0
Perth	25.0	Trieste	5.15
Greenock	34.6	Bohemia	2.0
Glasgow	36.0	Lombardy	2.0
Dublin	25.66	Venice	2.2
Cork	39.5	Sweden	2.7
Galway	35.0	Bavaria	4.0
Limerick	41 0		
Connaught ten years, ending 1841	60.0		
All Ireland, ditto	49.0		
England and Wales (eight years)	21.9		

*From Parliamentary Return, April 26, 1853.

Mortality of Small-Pox in Copenhagen for a Period of 100 *Years before Inoculation, during Inoculation, and during Vaccination,* 1750–1850.

YEAR.	Remarks and Population.	Died of Small-Pox.
1750	60000	1457
1751		80
1752		113
1753		53
1754	Inoculation introduced	9
1755	Inoculation Hospital founded	1117
1756		125
1757		13
1758		13
1759		1079
1760	Inoculation Hospital closed.	118
1761		4
1762		7
1763		167
1764		480
1765		138
1766		42
1767		6
1768		27
1769	70495	1219
1770	Inoculation Establishment introduced	22
1771		8
1772		22
1773		190
1774		116
1775		276
1776		86
1777		7.
1778		270
1779		283
1780		98
1781		174
1782		332
1783	Inoculation Establishment closed	123
1784		77
1785		427
1786		193
1787		136
1788		185
1789		323
1790		140
1791		297
1792		155
1793		139
1794		452
1795		248
1796	83604	357
1797		423
1798		386
1799		45
1800		35
1801	Vaccination first introduced, 91631 2	486
1802	Vaccination Establishment erected	73
1803	Commission recognize protective power of vaccination.	
1804		13
1805		5
1806		5
1807		2
1808		46
1809		5
1810 1811	Decree ordering vaccination promulgated	4
1812	100975	
1813		0
1814		0
1815		0
1816		0
1817		0
1818		0
1819		0
1820		0
1821		0
1822		0
1823		0
1824		41
1825	Vaccination placed under control Board of Health.	12
1826		29
1827		4
1828		1
1829		29
1830		3
1831		0
1832		3
1833	Revaccination general.	19
1834	119292	26
1835		434
1836	119591	81
1837	Revaccination ordered for the army.	1
1838		2
1839		0
1840		2
1841		0
1842		35
1843		111
1844	Revaccination ordered for the navy.	83
1845	126787	7
1846		0
1847		0
1848		2
1849		7
1850	129695	0

Mr. Simon's Report (Papers Relating to the History and Practice of Vaccination, p. 171. Vaccination, Edward Ballard, M. D., p. 375).

*Table Showing for Several Centuries the Death Rate from Small-Pox during a Period prior to the Introduction of Vaccination and since the Introduction of Vaccination.**

Sums of Years Respecting Which Particulars are Given.	TERRITORY.	Approximate Average Annual Death Rate per Million of Living Population.	
		Before Introduction of Vaccination.	After Introduction of Vaccination.
1777-1806 and 1807-1850	Lower Austria	2,484	340
1777-1806 and 1807-1850	Upper Austria and Saltzberg	1,421	501
1777-1807 and 1806-1850	Styria	1,052	446
1777-1806 and 1807-1850	Illyria	518	244
1777-1806 and 1807-1850	Trieste	14.046	182
1777-1806 and 1807-1850	Tyrol and Voralberg	911	170
1777-1806 and 1807-1850	Bohemia	2,174	215
1777-1806 and 1807-1850	Moravia	5 402	255
1777-1806 and 1807-1850	Gallicia	1,194	676
1777-1806 and 1807-1850	Austrian Silesia	5,812	198
1787-1806 and 1807-1850	Bulkorania	3,527	516
1817-1850	Dalmatia	....	86
1817-1850	Lombardy	....	87
1817-1850	Venice	....	70
1831-1850	Military Frontiers	....	288
1776-1780 and 1810-1850	Prussia (Eastern Provinces)	3,321	556
1780 and 1816-1850	Prussia (Western Provinces)	2,272	356
1780 and 1816-1850	Posen	1,911	743
1776-1780 and 1810-1850	Brandenburgh	2,181	181
1776-1780 and 1816-1850	Westphalia	2,613	114
1776-1780 and 1816-1850	Rhenish Provinces	908	90
1781-1805 and 1810-1850	Berlin	3,422	176
1776-1780 and 1816-1850	Prussian Saxony	719	170
1780 and 1810-1850	Pomerania	1,774	130
1810-1850	Prussian Silesia	....	310
1774-1801 and 1810-1850	Sweden	2,050	158
1751.1800 and 1801-1850	Copenhagen	3,128	286

Table Showing the Relative Fatality of Small-Pox When it Affects the Unvacinated and Vaccinated.†

Places and Times of Observation.	Total Number of Cases Observed.	Death Rate per 100 Cases.	
		Among Unvaccinated.	Among the Vaccinated.
France, 1816-41	16,397	16½	1
Quebec, 1819-20	2	27	1⅜
Philadelphia, 1825	140	60	0
Canton Vaud, 1828-9	5,838	24	2 1-6
Durkehmen, 1828-9	134	18 4-5	0
Verona, 1828-39	909	46⅜	5¼
Milan, 1830-51	10,240	38⅓	7⅜
Boston, 1831-33	220	53 4-6	2 1-9
Wirtemberg, 1831½—5½	1,442	27⅓	7 1-10
Carniola, 1834-5	412	16¼	4 2-5
Vienna Hospital, 1834	260	51½	12⅓
Carinthia, 1834-5	1,626	14⅓	
Adriatic, 1835	1,002	15 1-5	2 4-5
Lower Austria, 1835	2,287	25 4-6	11⅓
Bohemia, 1835-1855	15,640	29 4-5	5
Gallicia, 1836	1,059	23⅓	5 1-7
Dalmatia, 1836	723	19⅜	8½
London Small-pox Hospital, 1836-56	9,000	35	7
Vienna Hospital, 1837-66	6,213	30	5
Kiel. 1852-3	218	32	6
Wirtemberg, no date	6,258	38 9-10	3⅓
Malta, no date	7,570	21 7-100	4 9-10
Epidemiological Society returns	4,624	19 7-10	2 9-10

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*Mr. Simon's Report; Papers relating to the History and Practice of Vaccination, 1857, p. 23.

†Papers relating to the History and Practice of Vaccination, p. 27.

The statistics relating to the effects of vaccination in reducing in a marked manner the mortality from small-pox in various countries, will be still farther extended and enlarged, under the subsequent division of this inquiry, relative to the history of the cow-pox, and the introduction of vaccination into the various states of the American Union.

The following conclusions and general results may be deduced from the preceding statistics.

1. *In every country in which the practice of vaccination has been adopted there has been a marked reduction of the mortality from small-pox.*

In times preceding the introduction of vaccination, small-pox was the terror of princes and the fierce unconquerable slayer of the people; and although its nature has lost none of its cruel and destructive attributes, it has been so effectually guarded that none need fear its attack, but those who neglect vaccination.

It is estimated that prior to the commencement of this century, out of every million of the population of England, 3000 persons annually fell victims to small-pox; during the ten years 1851, to 1860, the mean population of England and Wales was 18,996,916 persons; during the ten years, 42,071 individuals died of small-pox, which is in a ratio of 2214 per million of population for this whole period, or only 221. 4 on the average annually; therefore small-pox has been more than ten times less fatal to the people of England, than it was when vaccination was not known.

2. *The practice of inoculation promoted the spread of small-pox and increased the mortality from this disease.*

In London, during the latter half of the seventeenth century, when inoculation was not practiced, the death-rate from small-pox ranged from thirty-six to seventy-four per 1000 of all the deaths that took place, the mean being fifty-six; during the second or *inoculation* epoch, it ranged from eighty-seven to 108 per 1000, the mean being ninety-six; and during the third or *vacciation* epoch, it has ranged from twelve to forty-two per 1000, the mean being twenty-five.

In Copenhagen in 1750, with a population of 60,000, 1457 deaths occurred from small-pox; in 1755, 1117 deaths; in 1759, 1079 deaths; in 1769, with a population of 70,000, small-pox occcasioned 1219 deaths.

Vaccination was introduced into Denmark, in the year 1801; and during the ten years preceding there occurred in Copenhagen alone 2546 deaths from small-pox, which becoming more prevalent in 1801, carried off in that year 486 of the inhabitants of the city. From 1802 to 1810 inclusive, in the course of the nine years succeeding the introduction of vaccination, small-pox occasioned only 158 deaths; and from this latter year until 1824, although the population had risen to above 100,000 not a single death from small-pox was recorded.

Vaccination appears to have been introduced in Prussia in 1801, and in 1803, *inoculation for small-pox*, was prohibited; before the introduction of vaccination, 40,000 persons were said to die annually of small pox within the Prussian domains; in 1817, notwithstanding an extension of territory, out of 306, 728 deaths only 2940, were occasioned by small-pox; and this result was clearly due to the extensive practice of vaccination, the number of vaccinations far exceeding the number of births.

In the department of Breslau, in 1818, out of a population of 510,617 persons, 17,629 were successfully vaccinated; and although during this year small-pox was introduced at nine different places, only twenty-eight persons took the disease, and only six persons died of it.

Vaccination was introduced in the principality of Ansprach, in Bavaria, in 1801, and in 1807 regulations for public vaccination and the suppression of small-pox was promulgated by the Government, which were rendered still more stringent in 1808. In this principality, with a population of 266,406 individuals, three perished from small-pox during the years 1797-98-99, on an average an annual number of 500 persons, and in the single year 1800, no less than 1609 persons. In the year 1807, 500 cases and fifty deaths from small-pox occurred. In this year under the new regulations, 31,880 persons were vaccinated, and during this and the subsequent years, altogether 141,755, persons underwent the operation.

In the year 1808, only eight cases of small-pox, and one death occurred; in the year 1809, only eleven cases and four deaths; and from this time to 1818, only four cases, every one of which recovered. And yet during these three years small-pox was prevailing epidemically in the adjoining kingdoms of Wurtemburg, where vaccination was not enjoined until 1818.

According to Mr. Hendricks:[*] in Sweden, from the year 1749 to 1801, the proportion of small-pox varied from 1.2 per cent in 1786, to 25.16 per cent in 1779; in three years PRIOR TO THE PRACTICE OF VACCINATION, the small-pox deaths was under 1 per cent of all deaths in *no one* year; from 5 and under 10 per cent of all deaths in twenty-two years; 10 to 20 per cent in seventeen years; and 20 per cent in two years. DURING THE VACCINATION PERIOD, from 1802 to 1855, the proportion of deaths from small-pox varied from *no deaths* in 1846, to 343 per cent of the deaths from all causes is 1881. During this the vaccination period, the small-pox deaths were under 1 per cent, of all deaths in thirty-three years, from 1 and under 2 per cent in nine years 2 per cent and under 3 per cent in ten years; 3 per cent and under 4 per cent in two years, over 4 per cent in no one year.

It is also shown by the statistics of a large number of European States, collected by Dr. Seaton from the statistics of the Epidemiological Society (recalculated by Mr. Simon), that the mortality from small-pox per million of population has been vastly reduced since the introduction of vaccination. Thus the small-pox mortality in Trieste during the vaccination period has been seventy-five times less than it has been before, in Moravia twenty-one times less, in Silesia twenty-nine times less, in Westphalia, twenty-five times less, in Berlin nineteen times less, in Sweden thirteen times less, in Lower Austria seven times less, and, in Copenhagen eleven times less.

3. *The mortality from small-pox has been least in those States, and places where the most complete arrangements have been in force for bringing the entire population under the protective influence of the vaccine disease; and when in the same county or localities the regulations for the enforcement of public vaccination have been more strict at one period than at another, and when this has been more actively carried out at one time than at another, the mortality of the population from small-pox has receded as the vaccination of the masses has been more perfectly ensured.*

4. *The evidence is conclusive that the vast majority of mankind may, by a single properly perfected vaccination, be rendered wholly unsusceptible of any subsequent action of the variolous poison; and that in the minority, where susceptibility to small-pox infection has not been entirely exhausted by the vaccine process, the disease will with rare exceptions be so modified as to be but rarely attended with severe or fatal effects.*

Vaccination, without endangering the life of the individual submitted to it, and without diffusing any infection, entirely and permanently exhausts the susceptibility to small-pox in the vast majority of those in whom it has been properly performed; but leaves an undetermimed proportion still subject in a greater or less degree to the action of the variolous poison. In those where susceptibility has been only partially destroyed, the action of the variolous infection may be manifested at any period, from a few weeks or months to any number of years, after the performance of the vaccination; but it is most frequently not manifested till after puberty, and when manifested before puberty is generally inconsiderable in degree and only quite exceptionally fatal. The degree of severity which post-vaccinal small-pox may manifest after purbety is chiefly determined by the perfection of character and sufficiency of amount of the vaccination that has been performed; even when the vaccination has been the most imperfect, leaving but a single mark of indifferent character, the disease is still in most instances modified in its course, and is not fatal in one third the proportion of cases in which natural small-pox is fatal; but when the vaccination has been done in the best manner, the modification is so great and so general that the proportion of deaths to attacks is scarcely more than the seventieth part of that which occurs in the natural disease. It is therefore a matter of vital importance that the vaccination should always be done in the best known manner. *

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[*] Vital Statistics of Sweden from 1749 to 1856,—Statistical Journal, 1862, Vol. 25, p. 142.

5. *Revaccination should be performed on all persons after puberty; and in all cases irrespective of the age (before or after puberty), when the vaccination has been imperfect in character, spurious, irregular, or disturbed in its normal course.*

After successful revaccination, small-pox, even of the most slight or modified form, is rarely met with. Thomas Heim found that in five years there occurred among 14,384 revaccinated soldiers in Wurtemberg not one instance of varioloid, and among 30,000 revaccinated persons in civil practice only two cases of varioloid occurred, although during three years small-pox had prevailed in 344 localities, producing 1,673 cases of modified and unmodified small-pox among the not revaccinated and in part not vaccinated population of 363,298 persons in those places in which it had prevailed.

In the Prussian Army, since the introduction of systematic revaccination in 1839, the cases reported as "varioloid," and, still more, those called "variola," have been nearly all of them among that portion of recruits whose turn for revaccination had never come, on whom revaccination had not been successful, or who were incubating small-pox when they were revaccinated; in the twenty years which immediately succeeded the adoption of this system there occurred altogether but forty deaths from small-pox in this large army—or an average of two deaths per annum—only four of the entire forty being in persons said to have been successfully revaccinated.

In the Bavarian Army, in which there had been compulsory revaccination since 1843, there had not from that date up to the time of a report made to the Minister of War, in 1855, been a single case of unmodified small-pox, and only a very few cases of modified small-pox without any deaths.—*Simon's Papers Relating to Vaccination, pp.* 35-36. *Seaton's Hand-Book of Vaccination, pp.* 268-273.

Mr. Marson has recorded the fact, that during the period of his connection with the Small-pox Hospital, not one of the nurses or servants had taken the small-pox during her residence there, each one of them who had not already had small-pox having been carefully re-vaccinated before being allowed to enter on her duties (*Medica Chirurgical Trans. vol.* 36). Mr. Marson had been connected with the Small-pox Hospital above seventeen years when he made the preceding statement, which, according to Dr. Edward C. Seaton, "holds equally good now after a connection of more than thirty-two years."

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* The work of Dr. Edward C Seaton Medical Inspector to the Privy Council (Hand-book of Vaccination), will prove of value to every sanitarian and practitioner of medicine as it contains all the necessary details.

From the preceding considerations the important practical rule has been chosen: That every person should be re-vaccinated about the age of *puberty*, for the age of most danger from post vaccinal small-pox is from fifteen to twenty-five; on the other hand, when there is any unusual risk of small-pox, as in localities in which the disease is prevailing re vaccination may be and should be performed at any period of life after birth.

6. *During the nineteenth century the application of steam to the rapid transportation of human beings and merchandise, has furnished the most important and essential condition for the rapid and continuous spread of small-pox over the entire face of the habitable globe; and but for the discovery of vaccination by Edward Jenner, this pestilence would have reigned without intermission in all commercial centres and, been perpetually propagated along all the lines of human travel and intercourse.*

Fortunately for mankind, the application of steam to the wants of mankind was preceded by the discovery and diffusion of the process of vaccination.

OUTLINE OF THE INTRODUCTION OF COW-POX INOCULATION INTO VARIOUS COUNTRIES, AND ESPECIALLY THE NEW ENGLAND, MIDDLE AND SOUTHERN STATES OF THE UNITED STATES OF NORTH AMERICA.

The following observations, facts and statistics will show that the most powerful and impregnable argument in behalf of vaccination is furnished by the simple historical narrative of the INTRODUCTION OF COW-POX INOCULATION IN VARIOUS COUNTRIES. The labor necessarily endured in the tedious search through the records of medical science. and the still greater labor of analysis, comparison and synthesis, has received the great and inestimable reward of establishing, by numberless facts, the value of vaccination in preventing and modifying small-pox, and in vastly diminishing the sufferings and mortality of the human race.

HISTORY OF COW-POX INOCULATION IN ENGLAND.

It does not appear that the anti-variolous power of cow-pock was generally taken notice of in England until after the introduction of small-pox inoculation; before that time a knowledge of it was chiefly confined to cow doctors, farmers, etc., who did all in their power to keep its existence a profound secret, lest it should hurt the character of their milk. When inoculation for small-pox was first practiced in England, most of the practitioners engaged in it frequently experienced disappointment in communicating that disease by inoculation or otherwise, and they constantly found that those who thus resisted the infection had previously had the cow-pock. About one hundred and twenty four years ago, three surgeons, Messrs. Fewster, Grove and the celebrated Sutton, formed a connection for the purpose of inoculating for the small-pox.

In their practice, which became very extensive, they found that a great number of patients could not be infected, notwithstanding repeated exposure under the most favorable circumstances. At length the cause of the failure was discovered, by the case of a farmer whom they could not infect with the small-pox, though he assured them he never had the disease, but told them he had had the cow-pox. This fact incited the gentlemen to inquire into the particulars of those cases in which they could not communicate the small-pox, and they found that all the patients who resisted the infection of the disease had labored under the cow-pox at some period or other of their lives. The result of their observations on this head, in an ample experience, during many subsequent years, was invariably the same. And many other gentlemen, extensively engaged in variolous inoculation, have since discovered that their want of success in infecting patients with small-pox proceeded from the same cause.

In the year 1780, a young womam who some years before had taken the cow-pox while milking cows, being desirous to know whether this circumstance would secure her from the small pox, went to the Small-pox Hospital in London, where she was inoculated and exposed in all possible ways to the contagion, yet did not take the disease. A man who had had the cow-pox several years before, went to the Hospital, and was inoculated for small-pox; he remained there in the very midst of contagion for several weeks, but did not take that disease. About one hundred and thirty-two years ago, a farmer who lived in Wiltshire, when he was going to London, being asked whether he was not afraid of the small-pox, replied—no—for he had had the cow-pox.

In a letter dated Axminster, April 12, 1802, from Mr. Nicholas Bragge to Sir William Elford, Baronet, we find the following communication: "It is now more than thirty years ago that I first made experiments, and proved that the vaccine disease was a preventive against the small-pox, and it is, I believe, more than twenty years ago, that, through the Rev. Hermen Drew, I acquainted Sir George Baker, Baronet, with the observations and experiments I had made. It is twenty years ago that Mrs. Rendall, the wife of a vegetable farmer in the parish of Whitechurch, near Lyme, in Dorsetshire, inoculated herself and three or four children for it; *and these children, who have long since arrived at manhood, have inoculated their friends and neighbors whenever an opportunity has offered.*" Many communications of a similar nature may be found in the Report of the Committee of the House of Commons on Dr. Jenner's Claims.

In the year 1767, a butcher, near Bridgeport, aged twenty, being informed that if he would allow himself to be inoculated with cow-pock, it would preserve him ever after from taking the small-pox, with which he had not been previously affected, was accordingly inoculated by a needle in two or three places on the hand. In eight days the parts inflamed, the hand swelled, headache and other symptoms of fever came on. He was afterwards inoculated for small-pox several times, and exposed in every way to it, but did not take the disease.

Mr. Benjamin Jesty, farmer of Downshay, in the Isle of Purbeck, appeared at the Vaccine Pock Institution, London, in August 1805, when he afforded satisfactory evidence of his having vaccinated his wife and two sons, Robert and Benjamin, in the year 1774, who were thereby rendered unsusceptible of small-pox, as appeared by the exposure of all the three parties to that disorder frequently during thirty-one years, and from the inoculation of the two sons for small-pox nineteen years before. He was led to undertake this novel practice in 1774, from knowing the common opinion of the country ever since he was a boy, that persons who had gone through the cow-pock were unsusceptible of small pox, from himself being rendered incapable of taking that disease, having gone through the cow-pox many years before; and from having known many individuals, who, after the cow-pock, could not be infected with small-pox. During their visit to London, Mr. Jesty and son willingly submitted publicly to inoculation—the former with cow-pock, and the latter with small-pox—in the most rigorous manner, but neither could be infected.

Mr. White, of Bath, in a letter to Mr. Creaser, of that city, mentions the case of a laboring man who, about the year 1780, being then a farmer's boy, had the disease communicated to him in a frolic, upon a small scratch in his hand, by one of his fellow servants, who had gotten it by milking a cow. He has since been repeatedly inoculated without effect; his family has had the inoculated small pox around him, and he has more than once been exposed to the most malignant species of that disease without any sort of effect being produced upon him.

About the year 1782, when Dr. Archer was physician to the Hospital for Small-pox Inoculation, Catherine Wilkins, from Crichlade, Wittshire, who had had the cow-pock, in consequence of milking cows, came to her brother in London, who, being desirous of ascertaining whether this circumstance could be depended upon as preventive of the small-pox, sent her to the hospital for inoculation, where she was inoculated with variolous matter by the doctor, against which, however, she was proof.

In the year 1787, when there was a general inoculation for the small-pox in Wincaunton, in Somersetshire, a young woman was twice inoculated without effect. The failure was attributed to having had the cow-pox some years before.

The failure so often remarked of communicating small pox to blacksmiths by inoculation, must have arisen from them previously having been infected with the equine pock, in dressing the horses' heels laboring under that complaint.

The first allusion to cow-pock on record is noticed by Dr. Jenner, in a letter to Mr. King, "When the Duchess of Cleveland," said he, "was taunted by some of her companions, that she might have to deplore the loss of that beauty which was then her boast, (the small-pox at that time was raging in London) she made a reply to this effect, that she had no fear about the matter, for she had had a disorder, which would prevent her from ever catching the small-pox." The author from whence this intelligence was derived, could not be recollected, but Dr. Jenner was disposed to believe that it alludes to cow-pock.

Jenner, in his first treatise, besides referring to cases in which the disease had been accidentally transferred to various persons at different periods long past, mentions it as having been specially noted in the Gloucestershire dairies in 1770, 1780, 1782, 1791 and 1794.

Jenner's first vaccination was performed in 1796, from a casual vesicle on the hands of a milker, but this source was not gone on with. In 1798 he met with the disease again, then raised his first stock of lymph. After the publication of Jenner's discovery, accounts were obtained of cow pox having occurred in at least eighteen counties besides Gloucestershire, the county in which his own observation were made. In January, 1799, Woodville met with the cow-pox in the London dairies, and propagated the disease to the human subject. In the spring of the same year cow-pox was seen in North Nibley, in Gloucestershire, and another stock obtained from it for Jenner's use, and soon after he also obtained a new supply from the Kentish Town.

In 1836, Mr. Leese, one of the vaccinators of the National Vaccination Establishment, obtained a stock from the cow, and propagated it.

In 1838, the disease was met with in Gloucestershire by Mr. Estlin; in *1838 or 1839,* in Dorsetshire, by Mr. Fox, of Cune Abbas; in 1839, also in

Dorsetshire, by Mr. Sweeting, of Abbotsbruy; in 1838, 1840 and 1841, in the Vale of Aylesbury, by Mr. Ceely; from all these sources lymph was transferred to the human subject.

No doubt the disease might have been found much more frequently if it had been only thought worth while to look for it, and it is probable, also, that cases had been found, and used for raising lymph, which have passed unrecorded.

When the Epidemiological Society made inquiries in 1851, several instances in which practitioners had met with cow pox, and had vaccinated with the lymph obtained from it, were brought to light; as by Donald Dalrymple of Norwich, by Mr. Beresford of Narborough, in Leicestershire; by Mr. Gorham of Aldeburgh, by Mr. Alison of Great Retford, by Mr. Coles of Leckhampton, by Mr. Rudge of Leominster, and one or two others. Mr. Sweeting met with the disease in two instances, and disseminated lymph obtained by the vaccination of persons from each source.

In Ireland cow-pox was early reported as having been known, and antivariolous powers attributed to it.

It is also worthy of note that Dr. Gregory experimented with a renewed lymph at the Small-Pox Hospital[*] in 1836.

The source of the new lymph is not mentioned, but the difference in results from the lymph in use at the hospital, may be given in Dr. Gregory's own words: "the lymph in use at this hospital has been preserved in uninterrupted descent for a very long period of time; but for three or four years past I have noticed that its intensity was diminished, and that eight or ten incisions produced no more irritation than the three to which I was accustomed fifteen years ago. In March last (1836) Mr. Marson, the resident surgeon, employed lymph obtained from a different source. This lymph was found to be more intense and active than the old lymph. Three or four incisions were now found amply sufficient; and so satisfied was I of the superior quality of the new lymph that, after a careful trial of about two months, the old lymph was suffered to die out, and for the last six months we have vaccinated from the new stock. The facts have convinced me that vaccine lymph in passing through the bodies of many persons loses in process of time some essential portion of its activity. It follows from this that an occasional resort to primary lymph from the cow becomes a matter of great importance, perhaps even of indispensable necessity."

HISTORY OF THE COW-POX IN IRELAND.

According to Dr. Samuel B. Labatt[†], in some parts of Ireland, particularly in the County of Cork, the cow-pock, under the name of the *shinach*, has for ages been esteemed a perfect preventive of the small-pox, so much so that old women have been in the habit of bringing children to the neighboring dairies to have them affected with it. Dr. Barry, of Cork, gives many instances of persons having had the cow-pox more than fifty years before; and informed Dr. Labatt, that one woman, aged eighty years, asserted that as long as she could remember, an opinion prevailed, that those who had the cow-pock cannot take the small-pox, and that people purposely exposed themselves to the former under that persuasion.

Dr. Huston, of Colerain, an eminent practitioner of long standing, and one of the earliest and most zealous promoters of vaccination in Ireland, communicated to Dr. Labatt the following facts:

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[*] Medical Gazette, vol. xxi, p. 861.

[†] An Address to the Medical Practitioners of Ireland, on the Subject of Vaccination. Second Edition. By Samuel B. Labatt, M. D., etc., Dublin, 1840.

"Before Dr. Jenner's discovery of cow-pock, I met with two mothers of families who had not had small-pox, and when inoculating their children, I inoculated the mother also. All the children passed through the disease regularly and safely, but nothing took place in the mother's but a trifling local affection; and since the discovery of cow-pock I have met with many females who never had small-pox, and I inoculated some of them with small-pox infection, and in every one of them only local affection was produced; and I was, in several instances, able to trace this unsusceptibility to their having, several years before, contracted infection from the cow, in their hands in milking. I believe that almost all the female cases here mentioned were owing to cow-pox in milking, for few men escaped small-pox."

A gentleman from the County of Wexford, in 1804, informed Dr. Labatt of three women, who, the year before, in consequence of milking cows affected with sore nipples, were attacked with considerable inflammation of their hands, attended with much pain; they were then very young, and never had the small-pox, and although they were repeatedly since exposed to the contagion, they did not take the disease. Before the publication of Jenner's discovery, cow-pox had long been known in Wexford and the adjoining counties, where it was called *punthaus or punclhane*, and was esteemed a certain preventive of small-pox; it had also been observed among the cows in the neighborhood of Dublin.—*An Address to the Medical Practitioners of Ireland, on the Subject of Vaccination; Second Edition, pp.* 27–28.

HISTORY OF COW-POX IN THE DUCHIES OF SCHLESWIG AND HOLSTEIN.

The knowledge of the circumstances of the origin of cow-pox in different countries and at various times, is of great importance; for to this source must the medical profession, in all time to come, look for fresh uncontaminated supplies of vaccine matter, wherewith to protect mankind from the inroads of small-pox.

The history of cow-pox in England has up to the time of the publication of the work of Dr. Woodville, been fully recorded in the works of Jenner, Pearson and Woodville; and it has been shown that the disease was known in Peru and Mexico before the introduction of vaccination in those countries.

The most important addition to the history of cow-pox in the early part of the eighteenth century, was made on the third of December, 1802, by the Medical Faculty of Kiel, in their report to the Royal German Chancery of Copenhagen, relative to the cow-pox in the Duchies of Schleswig and Holstein.

The report of the Medical Faculty of Kiel was signed by Drs. Ackerman, Weber, Hensler, Fischer and Pfaff, and was based upon the replies to the memorial sent by them to all the districts, and other physicians of duchies and neighboring provinces, especially the Circle of Eaton, and circulated still more generally by the care of the chancery.

The second section of this report related to the observations which had been made on cow-pox as affecting the cow, as well as the facts known in Holstein prior to the Jennerian discovery; the effects of cow-pock on the human body, and especially its power of preventing small-pox.

In arranging the facts contained in the report, the Faculty of Kiel followed the order in which the questions were addressed to the physicians of *both duchies:*

1. *"How long has the cow-pox been known in either duchy, according to indisputable evidence?"*

The reports unanimously agreed in stating that, where it occurs, it has been known for several generations.

Dr. Heinze referred to an epidemic cow-pock among the herds at Ohlenrade as far back as 1746, and named his authorities, who were then living. A countryman, Daniels, of Halendort, remarks, that before the time of his mother, who is now eighty years of age, the cow-pox was known; and, in the family of Inspector Carstens, at Mouch Neversdorf, the knowledge of it goes as far back as when his grandfather was a boy.

According to the reports, the cow-pock was known in the greater part of Holstein, especially on the noble estates in the Pröbstey and their neighborhood; in the contiguous county of Oldenburgh; in the county of Eutin; in Oldesloe, Legeberg; and in the tract of country from there to Rendsburg; in short, in the Eastern parts in general, while it is totally unknown in the Western, as in Pennebury; in Glückstadt; and especially in the parishes, as those of Norder and Süderdithmarschen; in Wilstermarsch; in the marshes of Schleswig, Eiderstadt, and in the neighborhood of Tondeln. It prevails especially among the numerous herds of the great dairies; commonly spreads, when it appears, very quickly through the whole herd; and often returns to the same herd, like the epidemics of small-pox among men, after longer or shorter intervals of fifteen, twelve, ten, or even a few years. On the contrary, there are cases where, in the course of thirty or forty years, it has only appeared once in the herds of the same dairy. In the very country where it has once raged among the large herds of the dairies, it has not affected the single cows of the peasantry.

In Wulfdorf, the cow-pox was epidemic in 1762, while the cows were still in their stables; and again in 1764, after they were out at grass. As no vaccinations were taken, it affected the whole of them. The farmer whose name was Stuhr, did not regard it, as he knew a remedy which alleviated it much, and rendered it very short. It consisted of green *euphorbium* in powder, mixed up, to the state of a thick salve, with fresh butter. The size of a pea of this rubbed into every pustule, destroyed the poison; and a hard crust was quickly formed; the inflammation of the teats disappeared; the crust fell off in a few days; and, in a few days more the teats were well. He applied the same remedy to the hands of the milkers who were infected, and often prevented, by means of it, the painful inflammation of the arm.

In June, 1787, the cow-pox appeared in a herd of 400 cows at Fulterkamp, and became general. They were, in general, successfully treated, by the application of a compound linament; but some, to which it was not soon enough applied, lost their teats. Dr. Heinze quoted thirteen other cow-pox epidemics, which prevailed in different herds, in different years, and at different seasons; and by which individuals were infected, who resisted the small-pox during life.

2 and 3. *"What different kinds of cow-pox are known in your district? How are they distinguished from each other, by color or other character?"*

The reports furnished less conclusive information on these subjects. In general, they agreed that there are several kinds of pox which affect the cow, but the character of these are, in part, so imperfectly given, that an accurate diagnosis of them is still a deficiency. Several reports distinguished the cow-pox.

(*a*). In regard to its intensity, into mild and malignant. They, however, were said to resemble each other in their essential external characters, such as color and form; and to be distinguishable from each other by the following circumstances:

The *mild* are more distinct *(variol discutæ)*, and somewhat larger, being as large, or larger, than a pea; all the symptoms connected with them, as the swelling of the teat and udder, the pain, etc., are milder; and the subsequent ulcers are not so deep, and heal without any further bad consequences.

The *malignant*, on the contrary, are more frequently contiguous, and, as it were, confluent *(variol confluentes)*, and smaller, not being larger than a lentel; and, in the sequel, form a confluent ulcer, covered with a single crust, accompanied with much swelling and pain, and even sometimes causing the loss of the whole teat or udder.

According to some reports, however, the malignity of the cow-pox appears to be connected with other more specific differences:

(*b*). From the reports it appeared that there are various species, differing in their color, appearance, form, relation to the small-pox, etc.; but in most of the reports the characters were too vague to admit of the enumeration of the different species with certainty.

Dr. Nissen, by transmitting to the Medical Faculty of Kiel, colored drawings of the different kinds of cow-pox seen by himself, threw the greatest light on this subject. By comparing these drawings with the other reports, the Medical Faculty enumerates the following kinds of cow-pox.

1. The *Blue genuine cow-pox*, which is also described by some as blue-grey, pearl-colored, and even white. According to Dr. Nissen, they are the smallest which he has observed, and the most benign; they discharge much matter, and the ulcers eat somewhat deep, but they form a crust much sooner than the other kinds.

2. The *yellow cow-pox*, which was stated in the greatest number of the reports to be smaller than the former, and are described to be yellow from their first appearance, and to continue so, containing a yellow matter, are also contagious, but according to one account, at least, do not afford security against the small-pox. As observed by Dr. Nissen, the yellow, or brownish-yellow cow-pox, were larger than the blue, and almost transparent, emtited an extremely unpleasant and almost putrid smell; and soon degenerated into itchy, eating sores, from which matter and blood fell in drops. In cows with reddish stripes, they had more of a brownish color. They were infectious, and the boils and ulcers arising from them had the same unpleasant effect on those who milked them. Those who were infected by them were often confined several days in bed, suffered some pain in the pustules, and were in danger of losing some of their fingers.

To this species belong the red or yellowish-red variety, to which Mr. Henckel, surgeon in Lehnsahn, gave the title of malignant, and which, when together, acquiring the appearance of yellow wax, and stinking abominably.

3. The *Black Cow-pox*. Dr. Nessin alone described them minutely. They were larger than the blue species observed by him; had completely the appearance of scrofula; also, degenerated into bad ulcers, like the yellow kind; and, in the manner of their drying up, resembled them exactly. On the hands of the dairy-maids who were infected by them, they were equally large and black; and when they changed into ulcers are particularly deep.

4. *Wind Cow-pox*, which resemble blisters, and contain a watery fluid only; they are said to be less infectious than the yellow cow-pox, and to afford no security against small-pox.

5. *Red Cow-pox.* Dr. Heinze remarked them in about twenty cows in the country meadow in Pretz. The red vesicles stood like pearls, and contained thin matter.

4. *What influence is the cow-pox said to have on the cow, and, perhaps, also, on other animals?*

All the reports agree that the cow-pox, considered as a general disease, is slight, and that the constitution never suffers obviously, since during its continuance the cows eat, chew the cud, stale, and sleep as before; and, considered as a local disease, the degree of violence varies much; but even in the most violent degree, the general health does not suffer obviously.

It was always treated as a local disease, and the application of appropriate remedies, which individual farmers and cow doctors have long employed, and which, according to valuable observations communicated with regard to them by Dr. Heinze, are slight caustics, are attended with speedy effect. Even the secretion of milk in many cases is not obviously affected, and in the worst cases not entirely suppressed.

The influence of cow-pox in other animals is not mentioned in any of these reports, and one of these distinctly states, that other animals, as horses and sheep, which pasture on the same meadow with the diseased herd are not affected by it. Also all these reports mention only the cow-pox of milk cows, and never hint at its being communicated to calves, bulls, or oxen.

5. "*What proofs can be deduced from the accounts in your dictrict, with any certainty, that cow-pox is a preventive of small-pox?*"

The greatest number of reports, from the districts where cow-pox is known, agreed that its powers of preventing small-pox have been known as long as the disease itself.

About fifty cases were recorded in these reports, illustrating the security afforded against small-pox by cow-pox, with the names, age, and sex of the individuals when alive, and of the authorities, when dead, specified. The most remarkable was that of a woman, still alive in 1802, who had the cow-pox when a year and a half old, and who remained secure against small-pox infection for sixty years; another fifty-six years, some about forty, several thirty, and some twenty, almost all alive in 1802.

The daughter of a farmer of the name of Priehm, when fourteen years of age, was affected with the cow-pox in 1746, when it was epidemic in the herd at Ohlensade. She married a M. Martens; lost eight children in the malignant small-pox, whom she attended without being infected; and in 1802, being above seventy years of age, lived with her son; and four years before nursed her grand-child who had the small-pox from inoculation.

In 1742, when the cow-pox was epidemic in Legalendorf, Mrs. Volker, then only a year and a half old, was infected by her mother, who was at that time obliged to assist in milking the cows. On returning to her house, her mother took her out of the cradle to wash her, probably without having previously washed her own hands; and a pustule, which had a bluish appearance, and had a large areola, appeared on one of the *labia pudendi.* In 1749 the small-pox came into the country, and she slept in the same room with her infected brethren; she also nursed her own children when ill with the small-pox; and at other times was frequently exposed to infection. In 1802, she was sixty-three years of age, and lived with her son-in-law, Daniels, in Legalendorf, and was still proof against small-pox infection.

Most of the fifty cases mentioned in the reports of having the cow-pox, were repeatedly exposed under the most favorable circumstances to the small-pox infection, and five of them allowed themselves to be inoculated for the small-pox along with their children, without any effect, although the latter took the disease.

There was rarely in the reports any specification of the kind of cow-pox which afforded security against the small-pox, but when there was, it is reported as *genuine blue cow-pox.*

Four observations of an opposite character were recorded, where small-pox occurred after cow-pox, in these reports. The wife of Abraham, steward at Behrensbrock, according to the information given to M. Mehring, Surgeon at Emkendorf, by her neighbor Lerch, who himself had had the cow-pox several times, had the cow-pox very severely; and, if Lerch remembered accurately, even several times, and yet she died of small-pox nine years before 1802. What kind of cow-pox she is said to have had is not mentioned. The second case was mentioned by Kofal, the dairy-woman on the estate of Caden, to the steward. Her son was infected pretty severely by the cow-pox in the hands and arms, in consequence of milking the cows; and, almost a year afterwards, he took the small-pox along with the rest of the children.

This was a case of infection by the spurious yellow cow-pox, as was fully proved by the accurate description of it, and by other circumstances, as the want of any constitutional affection, except the pain, and the absolute similarity of symptoms in those affected, whether they had previously had the small-pox or not, etc. Mr. Henckel, of Bensahn, Surgeon, relates two cases, but which on the one hand were not sufficiently attended, as the subjects were not alive, and on the other it was uncertain whether the cow-pox which failed to give them protection, was genuine or spurious.

Dr. Weber, more than twenty-five years before 1802, had his attention directed to the cow-pox by landed proprietors and dairymen, and made his pupils acquainted with the subject. Among the great numbers whom he inoculated with small-pox, he always met several from the country, of whom it was said, that the inoculation would not succeed, because they had had the cow-pox; and this was most commonly the case. A few of them only took the small-pox from inoculation. Even at that time he was informed that occasionally country people inoculated themselves by simply scratching the hand, and rubbing in fresh cow-pox matter, to prevent them from taking the small-pox. Two girls, effectually inoculated thus with the real blue cow-pox, the one three and the other five years, afterwards took the small-pox in a severe and confluent form. These two instances Dr. Weber knew from personal observation; and he had heard of two others from a farmer well acquainted with the eruption, one of which was his own daughter.

6 "*Has any unpleasant consequences been observed from the action of the cow-pox in the human body?*"

All the reports agreed that the cow-pox was followed by no consequences prejudicial to health. This was proved by instances of persons who had the cow-pox in their youth, were preserved from small-pox all their lives, and lived to the age of sixty, seventy and even eighty. The cow-pox received by infection in most of these reports, is described as very mild, so far as respects the general affection, and also as a local disease. A single case only is mentioned, in which a pretty smart fever with delirium, arose from infection; and several cases were quoted where the local affection was considerable, consisting of a great swelling of the whole arm, with violent inflammation and pain, but without being followed by any local consequences.

7. "*What effect has the cow-pox on those who have already had the small-pox, especially on the dairy-maids?*" Most of the reports agree that those girls who have had the small-pox are still susceptible to the cow-pox; but at the same time the local affection is much slighter, and the disease was then, in the strictest sense of the term, local.

8. "*We are assurred that, in small places of the duchies, there are families of country people in which either the real inoculation of the cow-pox, or at least intentional infection, by milking, has for several generations been practiced, partly as a secret for preserving themselves from the small.pox. Are there any proofs of this assertion in your neighborhood?*"

Although the reports contained no direct answer in the affirmative, it may be concluded, from several accounts, that particular families had long availed themselves of the advantages resulting from vaccination. Several instances are related in which they intentionally exposed themselves to infection from pustules in the cow, or even practiced inoculation coarsely, and recommended it to others.

It is further remarkable, in this point of view, that all the members of the family of the Inspector Carstens, from the grand-father downwards, viz., he and all his brethren, the father of Mr. Carstens and his mother, also his father-in-law and all his children, including Mrs. Carstens, were preserved from the small-pox by having the cow-pox in their youth.

Dr. Heinze relates a remarkable instance which fell under his own observation, of a schoolmaster, Plett, in Laboe, who, in 1792, inocculated three children of a farmer called Martini, at Lammershagen, by introducing fluid matter, taken from the cow, into a wound made with a pen-knife in the skin between the fingers, and with success, as they resisted the small-pox, when epidemic there, and who was only deterred from continuing the practice, by the great swelling in the arm of the youngest child.

9. "*Is there any positive proof, that persons having the cow-pox have infected others?*"

One instance is particularly mentioned by the Rev. Mr. Holst, of Riel, and Dr. Heinze, with the names of all the parties, some of whom were still alive, of a person who was infected with the cow-pox by milking a cow, communicated the disease to her sister's hand by rubbing it with her infected hand, by which means her sister was secured against the small-pox. A second case was mentioned of a child infected by its maid; and a third, of a child by its mother, who had previously milked a cow without either of them having the cow-pox themselves.

The propagation of the infection amongst the cows, was chiefly occasioned by the hands of the milkers, even when these were only soiled with the matter from the cow, and not themselves affected with the disease.

With reference to the question as to the *origin of the cow-pox from the grease (Manke)* in horses, all the reports with the exception of one answered in the negative. Mr. Fries, surgeon in Pratz, was informed by a veterinary surgeon of the name of Brasch, who lived upon the estate of Rixdorf, that the dairy-man at Tresdorf, below Rixdorf, had a newly foaled mare, so very ill with the *grease*, that at last the udder was affected to such a degree, that the foal could not suck her any longer. He therefore, ordered one of his maid-servants to milk the mare daily, and every day after milking her, to rub her hands with some ointment. This girl also milked the cows; and, in a short time, the whole of them were affected with cow-pox, of which there did not previously exist among them the slightest appearance. If this statement is accepted as correect, it is an evidence that the disease was not confined to the heel or the horn but affected the entire system, and it is now reasonable to regard this as an instance of horse-pox.

This view is sustained by the observations of Mr. Kolen, a veterinary surgeon, to the effect that persons who dressed the horses' heels afflicted with the grease (Manke) and then milked the cows, failed to communicate the cow-pox; and of the Privy Counsellor, Von Thienen, that on his estates, which were very wet, the grease was very frequent, while the cow-pox, in a period of forty years, has appeared in some of them only once, and others not at all; these marshes, and some other situations, where the grease is very common, being free from the cow-pox; the frequency of cow-pox in Holstein, where the milk-maids have no connection whatever with the horses.

COW-POX IN GERMANY.

In Germany, after the promulgation of Jenner's discovery, inquiries showed that cow-pox had been recognized in various places, especially in Mecklenburg, Holstein, Brandenburg, Silesia, in the country about Greissen and Erlargen, and also in Switzerland. A statement was found in a Gottingen newspaper, of the date of 1769, that this disease had been often seen about this place, and milkers affected by it were thereby protected against the small-pox.

An instance of cow-pox occurred in Wirtemberg in 1802. In 1812, the disease was seen in Berlin and its environs, by Bremer; near Luneburg, by Fischer, and in Greifswalde by Mende; in 1816, at Leggerde in Brunswick, by Giesker. In the eleven years preceding 1824, Luders saw several epizootics of the disease in Holstein, and in 1824, 1825, 1829, 1830 and 1832, Ritter made some successful vaccinations from cows which he found suffering from it in various parts of Schleswig-Holstein.

Ritter says that in some parts of Schleswig-Holstein the disease is very common; he had himself seen it on many previous occasions, but not in the stage admitting lymph to be taken, nor till the pustules on the milkers' hands had become sores. Probable examples of the disease were then met with in 1829 by Riss at New Breisach, and by Albers, near Stralsound, in 1834. The history of the discovery of cow-pox in Wirtemberg is interesting as showing how much these discoveries depend on the zeal with which the disease is looked for. In as much as the tendency of all herd-keepers and their servants is to keep secret the existence of any disease among their cattle, the Government offered premiums for the discovery of natural cow-pox in the cow; and in 1825 it was determined that a prize should be given for each case of cow-pox reported, which should be found in such a state that the character of the disease could be well ascertained, and the case used for vaccinating from. Cases were met with every year, and in eleven years (1827-37) the genuine cow-pox was found (in a state that successful vaccination could be performed from it) in sixty-nine different places, the cows affected by it amounting to eighty-four; besides which there were reports from 152 places, regarding 208 cows, in which the disease probably was cow-pox, though vaccinations were either not performed at all from them, or were unsuccessful.

In Holland, according to Numann, cow-pox was seen in 1805, in 1811, and in 1824.

In Russia, in 1838, an epizootic of cow-pox is said to have occurred among the cows in a village in the neighborhood of St. Petersburg.

In Italy, cow-pox was discovered in 1800, on the plains of Lombardy by Saceo, and again in 1808 and 1809, by the same successful vaccinator; in 1830 it was seen in Peidmont. In 1812 it was discovered at Naples. In 1832 and 1834, it was found at Rome on cows of Swiss breed, by Dr. Maceroni, and in 1834, a lymph-stock was established.

COW-POX IN FRANCE.

In France, cow-pox is said to have been found in 1810 in the department of La Meurthe; and in 1822, at Clairveaux. In 1836, it was discovered at Passy, Amiens and Rambouillet; in 1839 it was discovered at Rouen; in 1841, at Saint Illide, at Saint Seine, at Pertlhac; in 1842, at Pagnac; in 1843, at Veux Junieaux; in 1844 in a cow belonging to M. Magendie; in 1846 in three departments; in 1852 at Rheims, and also in the department of Eure-Et-Loire; in 1854, in the arondisement of Sancerre and at Bezieres; in 1863, at Guzonville; in 1864, on farms in three villages near Nogent, at Petit Quevilly, near Rouen. In 1866, cow-pox was discovered at Beaugency.

OBSERVATIONS OF M. J. B. BOSQUET* ON THE COW-POX (PETITE-VEROLE DES VACHES), DISCOVERED AT PASSY, NEAR PARIS, ON THE TWENTY-SECOND OF MARCH, 1836.

On the twenty-first of March, 1836, a woman residing at Passy, a milker, applied to a medical man in the neighborhood on account of an eruption upon her hand. He recognized the affection as the cow-pox, and the same day sent the woman to M. Bosquet.

Bosquet states that there were vaccine pustules on the right hand and one upon the upper lip, and he was struck by the unusual bluish tint they exhibited, such as Jenner had mentioned as a characteristic of the cow-pox. From a pustule on the hand he vaccinated nine children. The lymph was taken late in the course of the disease; it was thick, white and purulent. Bosquet, however, vaccinated the children with it by three punctures on the left arm, and used the ordinary humanized lymph in three places upon the right arm. In one of these nine children no effect followed in either arm; in the others the old lymph took, and from twenty-four punctures there were obtained twenty-two pocks. But in only three of these eight children did the new lymph take upon the left arm, and in each of them it took only in one place. Only one of these three children returned for examination on the eighth day—a weakly, puny infant, three months of age; three punctures on the right arm with the old lymph and one upon the left arm with the new, had given rise to pocks as miserable and languishing as the child itself. M. Bosquet took lymph from the pock on the left arm resulting from the vaccination with the cow-pox matter, and vaccinated four other children on the left arm, again making a comparative vaccination with the old lympt upon the right arm.

All the punctures took—the three with new virus on the left arms and the three with old virus on the right—on all the four children.

The vesicles ran a completely parallel course up to the seventh day, when a difference became perceptible in favor of the new virus. The vesicles were better formed, flattened and more depressed in the centre on the eighth day than those from the old virus, more brilliant in appearance and firmer, and the lymph they contained was as clear as crystal. On the twelfth day the difference was still more marked; the new vesicles were flat and nearly four lines broad, firm at the border, prominent and full of force and vitality; the old ones, on the other hand, were already beginning to dry up.

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*Sur le Cow-pox (Petite-Verole des Vaches) Découvert a Passy (Prés Paris), le 22 Mars, 1736. Notic epar J. B Bosquet, Secrétaire du Conseil et Membre de l'Académie Royale Médeciné, Chargé des Vaccinations Gratuites, Chevalier de laLégion-d'Honneur, etc. Ave une Planche Cilriée. A Paris, 1836.

M. Bosquet presented in his valuable memoir on the cow-pox discovered at Passy, in 1836, the following comparative view of the effects of the old humanized and the new lymph:

ANÇIEN VACCIN.	NOUVEAU VACCIN.
1°. Les deux premiers jours après l'operation, les piqûres ne présentent rien d'apparent.	1°. Dès le l'endemain de l'operation, on distingue ordinairement un point rouge qui indique un commencement de travail.
2.° Du troisième au quatrième, on aperçoit un petit point rose, plus sensible au doigt qu'à l'œil.	2°. Ce point d'un rouge plus vif, est aussi sensible à l'œil qu'au toucher.
3.° Dès le cinquième la pustule vaccinale commence à se dessiner avec tous ses caractères; déjà plate à son soumet, légèrement déprimée au centre; les jours suivans ces caractères ne font que se marquer davantage. Au septième jour la pustule tout entière reflète cet éclat argenté qui la caractérise, et commence à s'entourer d'une petite aréole rouge. La consistance en est si molle, que pour peu qu'on y touche avec la lancette, elle se vide, et le virus qui en soit est déjà un peu louche.	3°. Mêmes caractères, excepté qu'ils sont mieux dessinés; la depression est plus marquée, l'éclat plus brillant, la consistance beaucoup plus ferme. Le virus est parfaitement lempide. Il n'y a pas encore vestige d'aréole.
4°. Au huitième jour l'aréole grandit; au neuvième elle s'efface; la pustule plus large et plus haute, se ramollit encore. Le centre se courinne d'un point brun, signe certain d'un commencement de dessiccation. Le virus se trouble de plus en plus.	4°. Le bouton n'est jamais plus beau, plus ferme, plus brillant. L'aréole commence a se prononcée. Le virus conserve sa transparance et sa pureté.
5°. Du dixième au douzième jour la dessiccation fait des progrès rapides Le bouton tout entier se couvre d'une croûte jaunâtre encore molle, laquelle brunit de plus en plus, et se rapetisse en prenant plus de solidité.	5°. La pustule se dévelloppe en tous sens, sans changer de caractère. L'aréole est large et vive, le tissu sous-pacent profondement engorgé. Les glandes de l'aisselle souvent douloureuses, tumifiés, principalement chez les adultes. Néaumoins il n'y a pas toujours de fièvre, s'il y en a, c'est principalement à ce moment qu'elle est sensible. Le virus commerce à se troubler; mais il n'en est pas moins bon à transmettre.
6°. A partir du trezième jour, la croûte réduite au volume d'une grosse lentille, se sèche toujours davantage, et en séchant elle diminue encore. Elle tombe communement du quinzième aux dix-huitième jour. Les cicatrices, en général très superficielles, se font plutôt reconnaitre à leur teinte rougeâtre qu'a la depression qu'elles laissent à la peau. Mais au bout de quelque mois, la peau revient à son ton naturel, et l'œil apeine à retrouvée les trace de la vaccine.	6°. Les pustules d'un diamètre de trois à quatres lignes, deséchées au centre, présentent un bounelet circulaire saillant élevé, et dont la transparence indique assez l'état du vaccin qu'il contient. Cet état dure jusqu'au quinzième jour, et quelquefois davantage. L'aréole est encore très vive et très etendue, comme on peut voir par la graveur.
	7°. Du quinzième au dix-huitième jour la dessiccation s'étend à toute la surface de la pustule. La croûte est plate, large, brune et comme terréfiée. Pour la couleur je ne saurais mieux la comparer qu'à une amande grillé. En même temps l'aréole pâlit et se retire insensiblement jusqu'à ce que enfin elle s'efface complètement. La chute des croûtes se fait commencement du vingt-cinquième au trentième jour. Aux croûtes succèdent des cicatrices larges, profondes et traversées par une foule de petites brides qui leur donnent

ANCIEN VACCIN.	NOUVEAU VACCIN.
	l'aspect réticulé. En y posant le doigt, on sent une cavité comme s'il y avait en perte de substance. Il n'est pas rare que les croûtes laissent après elles un plaie suppurante, un ulcure dont il faut attendre la cicatrisation. J'ai vu des pustules creusu si profondément la peau qu'elles y faissaient de verétables trous. pp. 18-19:

We may thus briefly sum up the results obtained by M. Bosquet from the use of the old and new lymphs in the numerous comparative vaccinations which he performed.

The new vaccine proceeds in its course at once more quickly and more slowly than the old—more quickly in that it sooner gives signs of life, more slowly in that its career is more prolonged. The resemblance between the two sources of virus is at no time greater than on the seventh or eighth day. From that period the vesicles are quite distinguishable the one from the other, and the more they advance the more pronounced becomes the separation. As to the size, those of the new vaccine often acquire a size almost double that of the others; they are also flattened, more brilliant, more umbilicated, better defined, and firmer. When looked at closely, they present to the eye a grained surface, something like that of the rind of an orange; they appear to be more closely and firmly attached to the skin, and as they become more developed they raise and drag upon it; while the old vesicles are slighter, more superficial to the eye, and more raised, and look as if separate from the skin, more after the manner of a "vesicle." Corresponding to this is the areola; in the one it is active, extended and phlegmonous; in the other, slight, fugitive and erysipelatious.

Bosquet describes the cicatrix in the old and new virus:

OLD.—The scars are in general very superficial, and make themselves evident when the crust has fallen, rather, by their reddish tint than by any depression left in the skin. At the end of some months, however, the eye can, with difficulty, if at all, discern any cicatrical trace whatever.

NEW.—The crusts are succeeded by large cicatrices, traversed by a multitude of little bands or bridles, which give them a reticulated appearance. Laying the finger in one of these a cavity is easily perceived, as if there had been a decided loss of substance. It is not uncommon for the crust to leave after them suppurating wounds or ulcers, the cicatrization of which may be considerably delayed.

M. Bruchir, of Versailles, also made comparative re-vaccination upon twelve persons, using the new lymph upon one arm and the old upon the other; he found that the new produced well developed and perfect pustules, equal in numbers to the punctures, while the old, if it took at all, gave only modified or false pustules. Several medical men experimented subsequently with the new lymph, and their observations confirmed those of M. Bosquet.

Similar results were obtained by Mr. Estlin, by the use of cow-pox matter, which he obtained on August 18, 1838, on a farm in Gloucestershire, where several of the cows were affected and where the farm servants had received the contagion. (Medical Gazette, vol. 22, p. 977, "Accounts of a Supply of fresh Vaccine Virus from the Cow." Medical Gazette, vol. 24, p. 2075.

Steinbrenner's observations with Mrs. Pass's lymph in 1840, and with new lymph obtained from other sources 1841 and 1845, confirmed the accuracy of the results announced by Bosquet in 1836.

DISCOVERY OF COW-POX IN AMERICA.

Don F. Xavier Balmes, Director of the Spanish Vaccine Expedition, discovered cow-pock in the cows of the valley of Allixico, near the city of Puebla de los Angelos, in the neighborhood ot Volladolid, in Mechvachan, and in the districts of Calaboza,. in the province of Caraccas, and in the Peruvian Andes.

Dr. Waterhouse informed Dr. Jenner of the existence of cow-pock in several parts of America, where its anti-variolous power was not unknown.

"As one of our periodical inoculations," says Dr. Waterhouse, "which occur in New England once in eight or nine years, some people drive their cows to an hospital, near to a populous village, in order that their families might have the daily benefit of their milk. These cows were milked by persons in all stages of small-pox, the consequence of which was, the cows had an eruptive disorder on their teats and udders, so like small-pox that every one in the hospital, as well as the physician who told me, declared the cows had the small-pox."

Thus according to Dr. Waterhouse the human small-pox was conveyed to the cow, in the same manner as the cow-pock was communicated from the cows to the milkers in dairy countries, and the statement was strongly confirmative of the doctrine of the identity of small-pox and cow-pox.

The important services rendered the citizens of the United States of America by Dr. Waterhouse and President Jefferson, in the introduction of vaccination into the United States will receive due consideration; we regard it of importance to place in the following facts in chronological relation with the discovery of cow-pox on the American continent.

Professor Waterhouse wrote thus to Dr. Samuel Mitchell, of New York, editor of "The Medical Repository and Review of American Publications," in a letter dated Cambridge, Massachusetts, September 26, 1801.

"President Jefferson informs me that the kine-pox has pervaded or is pervading his family at Monticello, more than twenty having gone through the *genuine* disease—at least I presume so from the virus sent him, and the description he has given me of its effects. It is progressing in this quarter with undeviating success, very few spurious cases having occurred this season.

"Yesterday I received a letter from Doctor Jenner, one paragraph of which I must transcribe, because it contains the *golden rule of vaccination.*

"I don't care what British laws the Americans discard, so that they stick to this—*Never take the virus from a vaccine pustule, for the purpose of inoculation after the efflorescence is formed around it.* I wish this efflorescence to be considered as the sacred boundary over which the lancet should never pass."—*Medical Repository, vol. 5, p. 235.*

In the history of cow-pox inoculation in the United States, it was felt at an early date, that a *necessity existed of establishing a point of time for taking the vaccine virus for the purpose of inoculation, as a popular criterion.*

It was difficult if not impossible correctly to apply Jenner's golden rule in the practice of cow-pox inoculation amongst the African Negro slaves of the United States, owing to the color and structure of the skin of their bodies.

In a letter from —— —— to Dr. Waterhouse, dated Washington, December 25, 1801, the following inquiry was made:

"Knowing how little capable the people in general are of judging between genuine and spurious matter from their appearance or that of the pustule, I endeavored, in the course of my inoculations at M——, to find some other criterion for their guide. With this view, I was very attentive to discover whether there was a *point of time*, counting from vaccination when the matter is genuine in all cases. I thought that eight times twenty-four hours furnished such a point. I governed myself by it, and it has been followed here successfully by Dr. Gantt; but your experience, so much greater, can inform us whether this rule is a sure one, or whether any other point of time would be still more certain. To the eye of experience this is not necessary, but for popular use it would be all-important; for otherwise the disease degenerates as soon as it gets into their hands, and may produce a fatal security. I think some popular criterion necessary to crown this valuable discovery."

The following is the answer of Dr. Waterhouse:

"I was forcibly impressed with the necessity of fixing on some point of time, by way of popular guide, when to take the vaccine fluid for the purpose of inoculation, in order to prevent the evils you suggest.

"I know that the perfection of the virus differs somewhat in different subjects; but in the formation of a general rule it is necessary to impose a limitation. Dr. Jenner says, 'I prefer the fifth day, or the sixth, or the seventh, eighth, or (if the efflorescence is not far advanced beyond the margin of the pustule) the ninth day.' But I conceive this is impossible to be discovered with requisite precision on the skin of the African. The criterion of lympid matter is fallacious; for, in the rising of a vesicle from almost any cause, the scarf-skin separates from the true, and a portion of *the superfluous water* of the blood, and sometimes of the coagulable lymph is found under it. I have known this *limpid* fluid exude in considerable quantity from the vaccine pustule that has been too much irritated by pricking, and exhausted of its virus. It gives a shining, glazy appearance to the thread. I know of no writer or practitioner who has made this distinction.

"Were I then to fix on a point of time, of all others, as a general and popular rule, I should say *eight times twenty-four hours*, this being the result of my own experience. "BENJAMIN WATERHOUSE.

"Cambridge, Jan. 28, 1802."—*Medical Repository, vol. 5., p.* 347.

Dr. Samuel T. Mitchell and Dr. Edward Miller, of New York, editors of *The Medical Repository and Review of American Publications*, at an early day in the history of vaccination, suggested to the physicians of the United States, to inquire for the vaccine disease among the cows of this country. —*See Medical Repository, vol.* 4, *p.* 322.

Dr. William Buel of Sheffield, in the State of Massachusetts, in a letter to Dr. Edward Miller, dated twentieth May, 1801, describes the case of a lad in his neighborhood affected with an eruption on the face and hands, greatly resembling vaccine pustules, to whom he was called on the tenth of the preceding month. With matter taken from these pustules, he inoculated several persons, and observed the disease to pursue a similar course and to exhibit similar phenomena to a case of actual vaccine pox under his care. And after the termination of this new disease, he tested it, as usual, by variolous inoculation, with the same happy results as in other cases of vaccine pox. Upon inquiry he found that he had sometimes milked cows, that these cows had been observed to have sore teats, and that the hands and face of the lad had been prepared for the reception of the disease by having been previously scratched in play with his companions.

Dr. Elisha North, of Goshen, in the State of Connecticut, who had bestowed much attention on the vaccine disease, found it among the cows of that neighborhood, and inoculated it with success.

In a letter of the twenty-fifth of May, 1801, to Dr. Edward Miller, he announced the discovery of cow-pox and stated that the inoculation of the disease had been tried in a number of instances with complete success.

Dr. Joseph Trowbridge of Danbury, in the State of Connecticut, in a letter to Dr. Samuel L. Mitchell, dated the sixth of July, 1801, communicated a similar discovery which he had made among the cows of that place. At that time he had inoculated three persons of his own family, and the disease produced by the inoculation exhibited all the appearences of the genuine vaccine pox. *Medical Repository, vol.* 5, *New York*, 1802, *p.* 92.

INTRODUCTION OF VACCINATION INTO THE UNITED STATES OF AMERICA.

Since the spreading of the small-pox on the earth, by the increased intercourse of mankind, its violence had been seriously felt by most civilized nations, frequently by the uncivilized people who traded with them. Dreadful were its ravages in Europe before the Asiatic method of lessening its fury by inoculation was introduced; and even after that time, and the adoption of this artificial and safe method of infecting the constitution with the venom, the benefits by inoculation were only partially experienced for it tended to keep alive the disease; the introduction of small-pox, even in the inoculated form, had been prohibited in some States by laws; and in others where no such prohibition existed, the expense and trouble of undergoing the disease, debarred many from submitting to its operation.

It seemed politic and proper to the governments of those parts of federated America, called the New England States, to prevent, by various legislative provisions, the introduction and spread of small-pox among their citizens in the natural way, and, in some, by inoculation. In consequence of such statutes, it was many years customary for persons in New England who wished to have the small-pox, to come to New York for the purpose of being inoculated, and, after their recovery, to return home. There was an inconvenience in this, but this was thought a mere trifle compared with the evil of its indiscriminate introduction. In sea-port towns, possessing a large share of foreign commerce, it had been found impossible to exclude this malady altogether; and in spite of all possible precautions, the contagion would, at certain times, be secretly introduced. To relieve themselves, in some degree, from the perpetual anxiety of having the small-pox spread among them in the *natural* way, the inhabitants of the town of Boston underwent a general inoculation, by common consent.

Dr. Benjamin Waterhouse, of Boston, who had previously published an instructive account of the various regulations concerning small-pox inoculation, was the first to describe to and urge upon his fellow citizens ot New England, the great discovery of Edward Jenner.

INTRODUCTION OF VACCINATION INTO THE NEW-ENGLAND STATES, MORE ESPECIALLY INTO BOSTON, MASSACHUSETTS BY DR. WATERHOUSE.

Early in the year 1799, Dr. Jenner's work on the variola vaccine reached the shores of North America.

Dr. Lettsom transmitted a copy of it to Dr. Waterhouse, Professor of the Theory and practice of Physic in the University of Cambridge, Massachusetts. Dr. Waterhouse was not slow to estimate the advantage of the discovery, and he published in the Columbian Sentinel of March 12, 1799, a short account of cow-pox. The article was headed "SOMETHING CURIOUS IN THE MEDICAL LINE." Not long afterwards he brought the subject before the American Academy of Arts and Sciences. John Adams, President of the United States, who was likewise President of the Academy, was at the meeting and received the communication in a manner worthy of his exalted position as the head of a great and free people. and the patron of every useful art and science.

After several unsuccessful attempts to obtain cow-pox matter from England, Dr. Waterhouse at length succeeded in getting some from Dr. Haygarth, of Bath, who forwarded it from Bristol. It was procured from Dr. Jenner's stock by Mr. Creaser. With this matter Dr. Waterhouse inoculated seven of his children, six of whom went through the disease in the usual manner. In order to confirm the doctrine of the prophylactic powers of the vaccine virus, he resolved to have his children inoculated with small-pox matter in the most public manner. With this intention, he wrote to Dr. Aspinwall, Physician to the Small-pox Hospital in the neighborhood of Boston, requesting him to inoculate the children. This gentleman assented to the proposal. Three of the children were sent to the Small-pox Hospital. One of them, twelve years old, was selected for the trial. Active small-pox matter was inserted by two punctures; an infected thread was likewise drawn through the skin, and the patient then left in the hospital. On the fourth day there was some slight appearance of infection; but it died away and left no traces of its action.

The successful vaccinations in the family of Dr. Waterhouse soon turned the tide of popular feeling in favor of cow-pox.

A vessel arrived from London at Marblehead. A common sailor on board was supposed to have the cow-pox. Matter was accordingly taken from him, and was used extensively. It was soon discovered that small-pox matter had been employed, and that disease spread rapidly through the neighborhood.

The occurrence at Marblehead led Dr. Waterhouse to believe that the vaccine virus had degenerated. He therefore sent a very urgent request to Dr. Lettsom, begging him to apply to Dr. Jenner for a fresh supply. Dr. Jenner complied with his request, and the matter which he sent out arrived early in the spring of 1801. Dr. Waterhouse forwarded some of the matter to President Thomas Jefferson, in whose hands it completely succeeded.

Thomas Jefferson did not think it beneath him to set an example to his fellow-citizens. In the course of July and August, Jefferson, with his son-in-law, vaccinated, in their own families and in those of their neighbors, nearly two hundred persons.

The estimate in which Mr. Jefferson held the discovery of Dr. Jenner, is shown by the following letter:

MR. JEFFERSON TO DR. JENNER.

MONTICELLO, Virginia, May 14, 1806.

Sir—I have received the copy of the evidence at large, respecting the discovery of the vaccine inoculation, which you have been pleased to send me, and for which I return you my thanks. Having been among the early converts of this part of the globe to its efficacy, I took an early part in recommending it to my countrymen. I avail myself of this occasion to render you my portion of the tribute and gratitude due to you from the whole human family. Medicine has never before produced any single improvement of such utility. Harvey's discovery of the circulation of the blood was a beautiful addition to our knowledge of the ancient economy;

but on a review of the practice of medicine before and since that epoch, I do not see any great amelioration which has been derived from that discovery. You have erased from the calendar of human afflictions one of its greatest. Yours is the comfortable reflection that mankind can never forget that you have lived; future nations will know by history only that the loathsome small-pox has existed, and by you has been extirpated. Accept the most fervent wishes for your health and happiness, and assurances of the greatest respect and consideration.

TH. JEFFERSON.

The following extract from a letter of Jefferson addressed to Dr. Waterhouse, illustrates the careful manner in which he studied the progress and varieties of the cow-pox.

"WASHINGTON, January 14, 1802.

"I have waited till I could inform you that some variolous, after vaccine, inoculations have proved that I had preserved the matter of the kine-pox in its genuine form. Dr. Coxe, of Philadelphia, has ascertained this, having received his matter from hence. To this is added your information that the matter I sent you produced the genuine disease, and consequently those in Virginia who received the matter from me are in security.

"Knowing how little capable the people in general are of judging between genuine and spurious matter from their appearance, or that of the sore, I endeavored in the course of inoculations at Monticello to find some other criterion for their guide. With this view, I was very attentive to discern whether there be not *a point of time*, counting from vaccination, when the matter is genuine in all cases; I thought the *eight times twenty-four hours* furnished such a point; I governed myself by it, and it has been followed here successfully by Dr. Gant; but your experience is so much greater, can inform us whether this rule is a sure one, or whether any other point of time would be still more certain. To the eye of experience this is not necessary; but for popular use it would be all important; for otherwise the disease degenerates as soon as it gets into their hands, and may produce a fatal security. I think some popular criterion necessary to crown this discovery."

In answer Dr. Waterhouse quoted to Jefferson, the opinion of Dr. Jenner, and fixed the time at "EIGHTH TIMES TWENTY-FOUR HOURS."

JOHN QUINCY ADAMS TO DR. JENNER.

BOSTON, JULY 13, 1802.

The following is the letter of Mr. Adams announcing the election of Dr. Jenner as a member of the American Academy of Arts and Sciences.

Sir—I have the honor of enclosing herewith a certificate of your election, by an unanimous vote, as a member of the American Academy of Arts and Sciences, and, in transmitting this testimonial of respect from my countrymen, I am sure of expressing their sentiments when I add that never since the institution of this society have its members enjoyed a more genuine and universal satisfactiom, by the accession of a new associate, than when they acquired the privilege of reckoning among their number the name of Dr. Jenner. I am, very respectfully, sir, your very humble and obedient servant,

JOHN QUINCY ADAMS.
Corresponding Secretary to the Academy of Arts and Sciences.

Dr. Benjamin Waterhouse* is justly regarded as the first person in America who successfully imported and inoculated the vaccine disease; and his exertions to introduce, disseminate and vindicate this inestimable substitute for the small-pox, have given him a just and elevated distinction among those who have signalized their zeal in the cause of humanity.

INTRODUCTION OF VACCINATION INTO THE SOUTHERN STATES, BY THOMAS JEFFERSON, OF VIRGINIA.

In the preceding observations upon the history of vaccination in the New England States, we have presented the outline of the efforts of Waterhouse and Jefferson to establish the value and promote the practice of vaccination amongst the citizens of the American Union.

The subject, however, is of such importance to sanitarians, physicians and legislators, that we record the following original documents, as given to the medical profession by Dr. Henry A. Martin, in his valuable memoir, entitled, "*Jefferson as a Vaccinator*:"†

> The first American vaccination was made July 8, 1800. By the first of September Waterhouse had vaccinated "about fifty persons of different ages, sexes and conditions," and "public attention was thoroughly excited." From "all parts of New England" he received "very numerous letters requesting further information, as well as a supply of *matter* for carrying on the inoculation."
>
> With Waterhouse's announcement of the successful vaccination of his family, and the thorough and triumphant test and proof of its value as a perfect *prophylactic* of *variola*, his labors and troubles began; labors and troubles to be continued through many years, utterly thankless and unrewarded, but performed and overcome with wonderful energy, enthusiasm and wisdom. Innumerable were the inquiries and demands for vaccine virus, and, although he was untiring in his efforts, innumerable the complaints, because all were not answered and every demand not immediately gratified.
>
> In the secular press, in the rarely appearing issues of medical journals, in every available way he ceaselessly cautioned the profession to be careful to follow *exactly* the precise and admirable rules laid down by Jenner, not one of which has failed to withstand the test of time, or to survive the antagonistic doctrines of innumerable theorists. Over and over again, he repeated, and enforced the repetition with much ability and eloquence that inestimable "GOLDEN RULE" of Jenner already referred to; adhering to which, exactly, one can hardly go amiss, and departing whence has been the fertile source of an incalculable amount of evil.
>
> It is not too much to say, that, with a precise and accurate knowledge of the development, from day to day, of the *vesicle* of true *vaccina*, not only from its first appearance to the formation of the *areola*, but from the decline of that efflorescence until the spontaneous fall of the scab, and of the true characteristics of the latter as well as of the scar which its fall reveals, and an inflexible determination to observe the "GOLDEN RULE," the practitioner possesses all the knowledge and principle necessary to make a successful and intelligent vaccinator.
>
> Waterhouse's cautions and labors were unheeded, misjudged and futile.
>
> In his words: "But these repeated cautions were disregarded by the young and sanguine practitioner, who saw nothing but regular cases, little trouble and great profits. If those whom it concerns will not attend to what is written expressly for their information, they must alone be answerable for the consequences. There are cases where ignorance is converted into a crime.

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* A Prospect of Exterminating the Small-pox, being the History of the Variolæ Vaccinæ or Kine-pox, commonly called the Cow-pox, as it has appeared in England; with an account of a series of Inoculations performed for the Kine-pox in Massachusetts. By Benjamin Waterhouse, M. D., Fellow of the American Philosophical Society, Academy of Arts and Sciences, etc., etc. Cambridge, Hilliard; 8 vo, p. 40. 1800.

A Prospect of Exterminating the Small-pox. Part 2. Being a Continuation of a Narrative of Facts concerning the Progress of the New Inoculation in America; together with Practical Observations on the Local Appearance, Symptoms, and Mode of Treating the Variolæ Vaccinæ, or Kine-pock, etc. By Benjamin Waterhouse, M. D., Professor of the Theory and Practice of Medicine in the University of Cambridge. 8 vo., pp. 139; Cambridge, Hilliard; 1800.

†North Carolina Medical Journal. Thomas D. Wood, M. D., Editor, Wilmington, January, 1881, vol. 7, No. 1, pp. 1–34.

The medical profession is indebted to the learned editor of the North Carolina Medical Journal for the preservation and publication of valuable articles relating to vaccination.

"Perceiving that my reiterated warnings were misconceived and misrepresented, and finding some professional gentlemen in the country so wrapt up in ideas of extreme simplicity, that they encouraged women and children to inoculate each other, I ceased from further expressions of that kind, and endeavored to content myself with predicting the consequences.

"During this period, viz: the autumn of 1800, a singular traffic was carried on in the article of *kine-pock matter*, by persons not in the least connected with the medical profession; such as stage-drivers, peddlers, and in one instance the sexton of a church. I have known the shirt sleeve of a patient, stiff with the purulent discharge from a foul ulcer, made so by unskillful management, and full three weeks after vaccination, and in which there could have been none of the specific virus; I have known this cut up into small strips, and sold about the country as genuine kine-pock matter, coming directly from me. Several hundred people were inoculated with this caustic morbid poison, which produced great inflammation, sickness, fever, and in several cases *eruptions*, with a greater disturbance of the system than what occurs in the true disease. It is worthy of remark that I could not influence these people to believe that they had *not* passed through the true disease, and that they were *not* secure from the small-pox. So true it is, that a man need not despair of making the common people believe anything *but* TRUTH! That vagrant quacks should stroll about the country, inoculating for half a dollar a head, and some for less, is not quite so surprising as that they should, in such a country as ours, find people weak enough to receive it from such hands! This imprudence ought not, however, to be attributed to the common people alone. Many young practitioners in country villages come in for a share of it. Not a few first inoculated themselves, and then others, without having read more than the newspaper publications, and some not even those, and were looking out for eruptions, and foretelling appearances and symptoms that are never attached to the disease; and if any very disagreeable occurrence arose, in the course of this imprudent practice, the odium reverted to me."

Following this is given a narrative of the terrible catastrophe resulting from all this reckless, ignorant, presumptuous tampering with a new and as yet a very imperfectly known practice, at Marblehead, a large Massachusetts town, an event which had a partial parallel at Norfolk and Portsmouth, in Virginia, and in other parts of the country. The result of all this malpractice and of an imperfect knowledge of the best methods of preserving "*stored*" vaccine virus was extreme and rapid deterioration, and, at last, entire loss of the first supply of true vaccine lymph in America.

"Very early in the spring of 1801" Waterhouse received "a fresh supply of *virus* from England from Drs. Lettsom and Jenner, and as soon after, more from Dr. Pearson, Dr. Woodville, Mr. Ring, Mr. Wachsel, Mr. Kerre, Sir Granville Temple and the Vaccine Institution of London, and also from Dr. Haygarth and Mr. Creaser, of Bath, and Mr. Dunning, of Plymouth Dock."* "Previous to this second importation," he writes, "I had reason to believe that the true *virus* had become extinct in America. *The inoculation was, however, carried on here and there, in the country, with such matter as they had.*"†

Those ample supplies were used immediately with prompt and perfect success, the narrative of which is given with a very admirable commentary on the contrast between the regularity and mildness of the development of the *true* and *protective* disease in contrast with the irregularity and violence of the phenomena and symptoms of that totally unprotective *spurious* disease, *apt* to result from the use of lymph taken from the vesicle after the formation of the *areola* and *sure* to follow the inoculation of decomposed or decomposing pus, but which many of Waterhouse's contemporaries, who misjudged his motives and disregarded his repeated cautions, had pronounced perfect and admirable developments of *vaccina*. All this is extremely interesting and might be republished and pondered even now with profit. The disasters and innumerable annoyances accompany the use and great abuse of the first importation of efficient virus determined Waterhouse to exercise the greatest caution in selecting those to whom he should distribute, what he calls the "second importation" of virus.

Vaccination had not yet been introduced into the Southern States, but, in his own words:

About this time (the spring of 1801) I received a number of letters from a variety of people in the Southern States, especially from Virginia, expressing a strong wish to be better acquainted with the kine-pock, and a desire to introduce this benign remedy into that extensive region. As most of the writers were entirely unknown to me, I was at a loss how to act. I might deny a physician of character, and I might entrust it to a person who had none. Some untoward occurrences in the past year rendered me cautious; for I had unknowingly encouraged mere *speculators*. I use that word in its modern and degenerate sense. While doubting what course to take, the right road opened to my view.

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*I have given Waterhouse's long list of English physicians and institutions supplying this "second importation" of virus, merely to illustrate the great extent of his European correspondence, as affording, too, slight indication of the arduous nature of his labors, as a missionary of vaccination, by those who were, above all others, competent to criticise and judge.

†The *italics* are mine. The employment of dubious vaccine virus, in the absence of any State or public institution whence perfectly reliable and *gratuitous* supplies might be always obtained, on a sort of theory, any false, in vaccination at any rate, that a poor remedy, or rather pretence of remedy, is better than none at all, has always been one of the great evils of America, and the cause directly of a vast amount of imperfect or quite illusory protection "protection," and *indirectly*, both by failure to afford immunity from small-pox and by the production of "bad arms" (the "loathsome hideous eating ulcers," "running sores," "disgusting eruptions," etc., of the anti-vaccinists) very serious injury to the cause and reputation of vaccina*tion in* this country.—H. A. M.

"I had heard that President Jefferson was favorably impressed by my first annunciation of the Jennerian discovery and practice. Indeed, the following letter, written in consequence of transmitting him a copy of my pamphlet on this subject, sufficiently testifies it:

WASHINGTON, December 25, 1800.

"*Sir*—I received last night, and have read with great satisfaction, your pamphlet on the subject of the kine-pock, and pray you to accept my thanks for the communication of it.

"I had before attended to your publications on the subject in the newspapers, and took much interest in the result of the experiment you were making. Every friend of humanity must look with pleasure on this discovery, by which one evil more is withdrawn from the condition of man; and must contemplate the possibility, that future improvements and discoveries may still more and more lessen the catalogue of evils. In this line of proceeding *you deserve well of your country;* and I pray you accept my portion of the tribute due to you, and assurances of high consideration and respect, with which I am sir, your most obedient, humble servant, '"THOMAS JEFFERSON.'"

[Copy.]
Dr. Waterhouse, Cambridge.[*]

"Hearing by some gentlemen direct from the seat of government that the President wished for still more information and that he was desirous to see the practice introduced into Virginia and the other Southern States," Waterhouse "sent him the vaccine virus and painted representations of the pustule[†] in all its stages on the white man and on the African." This precious package was accompanied by a long (seven pages in Waterhouse's book) letter, excellently written and giving a masterly *resume* of the whole subject of vaccination. A foot note informs us that this letter was repeated in many manuscript copies which were widely circulated "at the southward" and it doubtless contained the first *reliable* information on that subject received by many a Southern practitioner. Although this letter could hardly fail to interest Southern physicians, it would occupy too much space in a paper which has already far exceeded limits originally intended.

The following is Jefferson's answer. At the bottom, a note intimating that Jefferson's first letter had been considered a precious and grateful tribute to Jenner and, as such had been transmitted to him, is in the writing of Waterhouse:

WASHINGTON, June 26, 1801.

Your favor of the eighth instant came safely to hand with the several matters accompanying it; as the longer the vaccine matter should be unemployed, I knew the chance of its success would be the less. I thought it would be more likely to answer your benevolent views by having it employed here rather than by risking it by a further mission to Virginia. I, therefore, put it immediately into the hands of Doctor Gantt, a long established, judicious and successful physician of this place, together with your letter and the pamphlets and papers accompanying it. It turns out that it had still been too long unemployed; for of numbers inoculated with it from the thirteenth to this time, no one appears to have taken the infection. In the meantime a great anxiety is produced here to obtain a successful inoculation. I know not, however, how it will be obtained, unless you could continue your goodness so far as to inclose by post new matter two or three times successively until we can inform you that it has at length taken. You need not be at the trouble of writing a word, for it is making it troublesome enough to you to put the matter under cover and into the postoffice. The benevolence which has dictated the measures for which we are indebted to you, will, I hope, plead my excuse on this new request. I pray you to accept assurances of my high consideration and respect. TH. JEFFERSON.

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[*] This is the letter which, as a note on the margin of the second letter (the first *fac-simile* in the hand writing of Waterhouse informs us was sent to Jenner, and, of course, it is not to be found in series of *fac-similes*.

[†] "Pustule"—Waterhouse, here and elsewhere, uses the word "*pustule*" in describing the induced eruption of *vaccina*, rather than to appear, with what might be called, captiousness, to differ from Jenner and other English writers. The eruption of vaccina is not a pustule at *any* stage of its development. When the disease pursues a regular normal typical course, pus is never discoverable *in* the *vesicle*. After the formation of the *areola* pus exists in the tissues *outside* the *vesicle* as an accompaniment of the processes by which the cutaneous slough of which the crust is (with the desicated lymph) composed is cast off and the characteristic indellible scar is produced. Waterhouse knew this perfectly, as is evident from the following foot note to page 6, of the second part of his "Prospect of Exterminating the Small-Pox: "By the *pustule*, the British writers mean the circular sore, or vesicle made in the arm by inoculation; and not those eruptions, that have, in a few instances, appeared in places remote from the inoculated part. This difference in our phraseology has misled some among us. It ought not, strictly speaking, to be called *pustule*, until its contents have become *purulent*. The eruptions on the udder of the cow are more of *phylctine* than of the *purulent* kind." It may be usefully added that pus may appear *in* the vesicle, when it does it is as a result of injury or other causes and resulting inflammation and deterioration but this is not the regular normal or usual course, such a contaminated fluid is not fit to use for vaccination, but this fluid, a mixture of vaccine virus and pus, has been used times without number and even *pus*, quite unmixed with virus. We can well see how easily, by men, who regarded the *vesicle* as a *pustule*, a something *normally* secreting pus, and those who adopted the views of Coxe and others and collected material for their *inoculations* (they could not properly be called *vaccinations*) from the *site* of the vesicle so long as that *site* yielded or could be *compelled* to yield a fluid of almost any kind. The fact, for it *is* a fact, that a normal perfect vaccine scab is very sure to afford material for *perfect* vaccination was thought by Coxe and his school (whose name was and is Legion to triumphantly demonstrate the position that the above practice is quite free from objection. It would be extremely easy to exhibit the fallacy of this supposed proof and show that while a perfect typic a vaccine crust, from a healthy *vaccinifer*, generally affords excellent material for vaccination *fluid* taken from any vaccine vesicle *after* the decline, even after the full formation of the *areola* is extremely *apt* to be the very worst and although such fluid *may* and often *does* induce perfect *vaccina*, it should be always declined.

H. A. M.

N. B.—The first letter I received from Mr. Jefferson was dated December 29, 1800. It is printed in my Treatise, p. 2. I sent the original a present to Dr. Jenner, thinking, that coming from the Chief Magistrate of the Americans, it would not be unpleasing to the originator of vaccination.

Doctor Benjamin Warehouse.

The next letter informs Dr. Waterhouse that not only the first, but also a second supply of virus had failed, but expresses hope that the third will be more successful. This hope was to prove fallacious. The letter contains an *original* and excellent suggestion of Mr. Jefferson's for the preservation of *virus* in hot weather. It may be worth while to state that the present writer *thought* he had invented the same plan which he found very useful in the summer of 1872. He procured the manufacture of several hundred sets of glass vessels, similar to test-tubes, for distribution to his correspondents. Each set consisted of one vessel to contain the charged points and a larger one containing water in which the smaller vessel was enclosed. He spoke with considerable complacency of *his* invention for a month or two, only, at the end of time, to find that Mr. Jefferson was the inventor. This experience of the method convinced him that it is a good one and worthy of the recollection of practitioners wishing to keep virus from deterioration under certain circumstances, as for instance, on the office table during hot weather. It will be perceived that a small bit of this letter has been lost. There is no doubt the letters "tre" formed part of the word treatise, or that the reference is to a now quite rare pamphlet by Dr. J. C. Lettsom, entitled, "Observations on the Cow-Pock, London, 1801," a work principally noticeable for the portraits it contains of the four men then fully recognized as *the* leaders in the great innovation of vaccination, viz: Jenner, Pearson, Woodville and Waterhouse. The author believes the portrait of the latter and a poor reproduction of the same in the Boston *Polyanthos*, for May, 1806, to be the only engraved likenesses ever produced of a man, of whom, if men saw fit to thus honor their benefactors and saviors, rather than their disturbers and destroyers, the features would be perpetuated in "everlasting bronze" in every city of America.

A marginal note in the handwriting of Waterhouse and signed with his initials will be noticed.

WASHINGTON, July 25, 1801.

Dear Sir—Your favor of the seventeenth arrived last night, together with the new vaccine matter, which was immediately sent to Doctor Gantt. The second as well as the first supply of matter had failed. We hope the third will be more successful. How might it answer to put the matter into a phial of the smallest size, well corked, and immersed in a larger one filled with water and well corked. It would be effectually preserved against the air, and I doubt whether the water would prevent so great a degree of heat to penetrate to the inner vessel as does when it is in the open air. It would get cool every night, and shaded every day under the cover of the stage, it might perhaps succeed. I leave this place on the thirtieth instant for Monticello, being unwilling to risk myself on the tidewaters during the months of August and September. The situations which generate bilious complaints are most dangerous; my own is entirely exempt from that danger. Should you be so good as to continue forwarding matter till it succeeds, it will now be best to address the packages to Dr. Gantt, from whom, so soon as he succeeds, I shall ask a transmission of fresh matter to Monticello*, where I shall endeavor to introduce it. It will be a great service, indeed, rendered to human nature to strike off from the catalogue of its evils so great a one as the small-pox. I know of no one discovery in medicine equally valuable. Accept assurances of my great esteem and respect. THOMAS JEFFERSON.

P. S. I re-endorse Doctor Letsom's treatise.

Doctor Benjamin Waterhouse.

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* The matter sent agreeably to this direction was the first that succeeded.

The fourth letter acknowledges receipt of a further supply of virus, and refers to the terror with which small-pox was regarded in Virginia:

MONTICELLO, August 3, 1801.

Dear Sir—I had the pleasure of writing you on the twenty-fifth of July, acknowledging the receipt of yours of July 17, with the vaccine matter, which I immediately delivered to Doctor Gantt. Your favors of the twenty-fourth and twenty-fifth, sent to me at this place on the sixth instant, and the matter accompanying them was, by a skillful physician of the neighborhood, Dr. Wardlow, immediately inserted into six persons of my own family. We shall thus stand a chance of planting the disease here, where I imagine it will be as salutary as anywhere in the Union. Our laws indeed have permitted inoculation of the small-pox, but under such conditions of consent of the neighborhood as have admitted of not much use of the permission. That disease, therefore, is almost a stranger here and extremely dreaded. Will take car eto inform you of the result of our operation Accept my esteem and respect. THOMAS JEFFERSON.

Doctor Benjamin Waterhouse.

The fifth letter refers to still further receipts of *virus* and the use that was made of them, and also to two vaccinations made on the seventh of August which exhibited symptoms leading the writer to hope that success had been, at last, achieved.

MONTICELLO, August 14, 1801.

Dear sir—I wrote you on the eighth instant that your favors of July 24 and 26 had come to me here. Dr. Wardlow on the seventh inoculated two persons with the matter of the twenty-fourth and four with that of the twenty-sixth, the latter has no effect, but the. two former show inflammation and matter. Some of them complain of pain under the arm-pit, and yesterday was a little feverish; the matter is of this size and form ·; the inflammation about an inch all round from the pustule. We have considerable hopes he has the true infection. Yesterday I received your favor of the first instant; Dr. Wardlow immediately inoculated five of the former subjects with it, and one other; he also inoculated one from the pustule above described. You shall be regularly informed of the progress and success of this business. I learn from Washington, indirectly, that Dr Gantt's cases have all failed; should ours succeed, he shall be supplied hence. I am very anxious to obtain the disease here. Accept my best esteem and respectful salutations.

TH. JEFFERSON.

Dr. Benjamin Waterhouse.

The next letter announces the undoubted success with which *all three different lots of virus, transmitted by Mr. Jefferson's method,* had been employed.

MONTICELLO, August 21, 1801.

Dear Sir—I had the pleasure of informing you on the fourteenth instant, that I supposed the inoculation of the kine-pox to have taken effect in two subjects, these were from the matter you were kind enough to send July 24; that of July 26 succeeded with two others; that of August 1, with four. On the fifteenth instant, we inoculated from the two first subjects, fifteen others; fourteen of whom very evidently have the infection, so that we have twenty of my family on whom the disease has taken, besides some recent inoculations; some of them have slight fevers, headache, kernels under the arms, and one only has a very sore arm; most, however, experience no inconvenience, and have nothing but the inoculated pustule, well defined, moderately filled with matter and hollow in the centre. I have this day impregnated some thread and half a dozen toothpicks, which I forward to Dr. Gantt, who writes me that his inoculations all failed Dr. Wardlow, of this neighborhood, has so much other business, that he has been able to be with us only twice, however, I expect that the extent of my experiments will encourage the neighborhood generally. Engage him to introduce it in their families. To you they will be indebted for it, and I am sure they will be sensible of the obligation. Accept assurances of my great esteem and respect.

TH. JEFFERSON.

Dr. Benjamin Waterhouse.

Number seven announces the successful use in Washington, of *virus* sent there by Jefferson, the transmission of supplies to Richmond, Petersburg and other parts of Virginia, refers slightly to certain futile and disastrous previous attempts to introduce vaccination in Norfolk and Richmond which were followed by results similar to thsoe observed at Marblehead and had done much to impede the introduction and progress of true vaccination in the South, also to a proposed, but probably never executed publication of Dr. Waterhouse's long letter of instructions before alluded to.

MONTICELLO, September 17, 1801.

Sir—I received by the last post your favor of August 28, and by the same a letter from Dr. Gantt, informing me that the matter I first sent him from hence had taken on three of the subjects into whom it had been inserted; that from these he had inoculated others, so that they are now in full possession of the disease at Washington. I have also sent matter to Richmond, Petersburg and several other parts of this State, so that I have no doubt it will be generally spread through it, notwithstanding the incredulity which had been produced by the ineffectual experiments of Richmond and Norfolk. The first letter you were so kind as to write to me on the subject, and which contained a great deal of useful information, I put into the hands of Dr Gantt, and we concluded it would be useful to publish it as soon as the public should be possessed of the disease; it is still in his hands, and as you have been so kind as to permit us to make any use of it which the general good may require, I shall propose to him to have it published immediately on my return to Washington, which will be within a week from this time. It is just our countrymen should know to whose philanthropic attentions they will be indebted for relief from a disease which has always been the terror of this country. Accept my particular thanks for the great good, and assurances of my high esteem and respect.

TH. JEFFERSON.

Dr. Waterhouse:

The eighth letter is a very interesting one, and affords a good idea of the care and wisdom with which Jefferson proceeded in this whole matter. It refers to the supply of virus, from his own Virginia vaccinations sent (through Mr. John Vaughn) to Dr. J. R. Coxe, of Philadelphia, by means of which vaccination was first introduced into that city. After the *fac-similes*, a letter from Jefferson, which accompanied this supply of virus, is inserted, reprinted from Dr. Coxe's volume on the cow-pox.

WASHINGTON, December 25, 1801.

Dear Sir—I am indebted to you for several favors unacknowledged. I have waited till I could inform you that some variolous after vaccine inoculation had proved that *I* had preserved the matter of the cow-pox in its genuine form. Dr. Coxe, of Philadelphia, has ascertained this, having received his vaccine matter from hence. To this is added your information that the matter I sent you produces the genuine disease, and consequently those in Virginia who received the matter from me are now in security. Knowing how little capable the people in general are of judging between genuine and spurious matter from their appearance, or that of the sore, I endeavored, in the course of my inoculations at home, to find some other criterion for their guide. With this view, I was very attentive to discover whether there be not *a point of time* counted from the vaccination, when the matter is genuine in all cases. I thought the eight times twenty-four hours furnished such a point; I governed myself by it, and it has been followed here successfully by Dr. Gantt, but your experience, so much greater, can inform us whether this rule is a sure one, and whether any other point of time would be still more certain. To the eye of experience this is not necessary, but for popular use it would be all-important, for otherwise the disease degenerates as soon as it gets into their hands, and may produce a fatal security. I think some popular criterion necessary to crown this invaluable discovery. Accept assurances of my great esteem and respect.

TH JEFFERSON.

Dr. Benjamin Waterhouse:

The ninth and last of the series in which any reference is made to vaccination, is dated fourteen years after its nearest predecessor. It is a long and admirable letter, and is introduced here because it contains an eloquent and consoling tribute to Waterhouse amid the sad harvest of vindictive, malignant persecution and ingratitude he was reaping for so much enthusiastic, untiring, sagacious labor for the benefit of humanity; the only harvest he ever gathered, the only one that has ever yet been garnered by the *very* highest and noblest benefactors of mankind.

How long the list! How sad the thoughts its consideration must awaken! But, thank God, there have always been men to whom the lives of Galileo, Spinoza, Luther, Paré, Vesalius, Servetus, Harvey, Jenner, Bell, Waterhouse, and a very large and shining company of such men seem more attractive, with all their wrongs, poverties, disappointments, persecutions and chagrins, than those of the sleek, well-fed *orthodox*, CONSERVATIVE, successful and honored mediocrities who always have been, who *are* and *must* be, their triumphant rivals, opponents, persecutors. It is one of the best and surest anchors and hopes of humanity that there always have been, and probably always will be, men to whom a consciousness of the honest and fearless expression of important TRUTH, however unpopular or unappreciated, will always be more fascinating than the success and wealth which is too apt to soften and sweeten the lives of the docile apostles of routine and error.

A brief extract from a letter from Waterhouse to his old friend Lettsom is here appropriate. It is dated May 8, 1810: "For the honor of my country, I am ashamed to tell Dr. Jenner how I have been treated by our Legislature" (that of the State of Massachusetts) "respecting remuneration. I have received nothing but abuse, nay, more, I have been intrigued out of my place as Physician to the United States Marine Hospital, with 500 sterling a year, and given me by Mr. Jefferson as a reward for my labors in vaccination, and this merely in consequence of his going out and others coming in, so that, at fifty-six years of age, I have now to contrive and execute some new plan to supply this deficiency. * * * * Were I a single man and without children I would go to England; if not to live there, at least to die there. You do not knock a man on the head in Britain because he exerts himself more than his neighbors do. * * * Sometimes one man influences and impels the sentiments and conduct of the public. I am not calculated by nature or habit to control intrigue."*

MONTICELLO, October 13.

Dear Sir—I was highly gratified with receipt of your letter of September first, by General and Mrs. Dearborne, and by the evidence it furnished me of your bearing up with firmness and perseverance against the persecutions of your enemies—religious, political and professional. These last I suppose have not yet forgiven you the introduction of vaccination and annihilation of the great variolous field of profit to them; and none of them pardon the proof you have established that the condition of man may be ameliorated, if not *infinitely*, as enthusiasm alone pretends, yet *indefinitely*, as bigots alone can doubt. In lieu of these enmities, you have the blessings of all the friends of human happiness for this great peril from which they are rescued.

I have read with pleasure the orations of Mr. Holmes and Mr. Austin. From the former we always expect what is good; and the latter has by this specimen taught us to expect the same in future from him. Both have set the valuable example of quitting the beaten grounds of the Revolutionary War and making the present state of things the subject of annual animadversion and instruction. A copious one it will be, and highly useful if properly improved. Cobbet's address would of itself have mortified and humbled the Cossack priests; but Brother Jonathan has pointed his arrow to the hearts of the worst of them. These reverend leaders of the Hartford Convention nation it seems then are now falling out together about religion, of which they have not one real principle in their hearts. Like bawds, religion becomes to them a refuge from the despair of their loathsome vices. They seek in it only an oblivion of the disgrace with which they have loaded themselves by their political ravings, and of their mortification at the ridiculous issue of the Hartford Convention. No event more than this has shown the placid character of our Constitution; under any other their treason would have been punished by the halter. We let them live as laughing stocks of the world, and punish them by the torment of eternal contempt. The emigrations you mention from the Eastern States are what I have long counted on. The religious and political tyranny of those in power with you cannot fail to drive the oppressed to milder associations of men whose freedom of mind is allowed in fact as well as in pretence. The subject of their personal clawings and caterwaulings is not without its interest to rational men. The priests have so disfigured the simple religion of Jesus that no one who reads the sophistications they have engrafted on it, from the jargon of Plato, of Aristotle, and other mystics, would conceive these could have been fathered on the sublime preacher of the Sermon on the Mount. Yet knowing the importance of names, they have assumed that of Christians, while they are mere theorists, or anything rather than disciples of Jesus. Sone of them are beginning now to sling off these meritorious trappings; their followers may take courage to make thorough work, and restore to us the figure on its original simplicity and beauty. The efforts of this squabble, therefore, whether religious or political, cannot fail to do good in some way.

The visit to Monticello, of which you hold up an idea, would be a favor indeed of the first order; I know, however, the obstacles of age and distance, and should therefore set due value on its vicarious execution. Should business or curiosity lead a son of yours to visit this Sodom and Gomorrah of persons, Osgood and Gardener. Accept my wishes for your health and happiness and the assurance of my great esteem and respect

THOMAS JEFFERSON.

The following is the letter with which Jefferson transmitted that supply of virus to Dr. Coxe, of Philadelphia, which, as before intimated, inaugurated vaccination in that city. It is printed from Waterhouse's book into which it was copied from Dr. Coxe's "Practical Observations on VACCINATION, or inoculation for the COW-POCK, Philadelphia, 1802. Page 120, et seq."

WASHINGTON, November 5, 1801.

"*Dear Sir*—I received on the twenty-fourth ult., your favor of the twenty-second, but it is not till this day that I am enabled to comply with your request of forwarding some of the vaccine matter of Dr. Coxe. On my arrival at Monticello in July, I received from Dr. Waterhouse, of Cambridge, some vaccine matter taken by himself, and some which he at the same time received from Dr. Jenner, of London. Both of them succeeded, and exhibited precisely the same aspect and affection. In the course of July and August, I inoculated about seventy or eighty of my own family; my sons-in-law about as many in theirs, and including our neighbors who wished to avail themselves of the opportunity, our whole experiment extended to about two hundred persons. One only case was attended with much fever and some delirium; and two or three with sore arms which required common dressings. All these were from accidents too palpable to be ascribed to the simple disease. About one in five or six had slight feverish dispositions, and more perhaps had a little headache, and more of them had swelling of the axillary glands, which in the case of adults, disabled them from labor one, two or three days. Two or three only had from two to half a dozen pustules on the inoculated arm, and nowhere else, and all the rest only the single pustule where the matter was inserted, something less than a coffee-bean, depressed in the middle, fuller at the edge, and well defined. As far as my observation went, the most premature cases presented a pellucid liquor the sixth day, which continued in that form the sixth, seventh, and eighth days, when it began to thicken, appear yellowish, and to be environed with inflammation. The most tardy cases offered matter on the eighth day, which continued limpid the eighth, ninth, and tenth days. Perceiving, therefore, that the most premature as well as the tardiest cases embraced the eighth day, I made that the constant day for taking matter for inoculation, say, eight times twenty-four hours from the hour of its previous insertion. In this way it failed to infect in not more I think than three or four out of the two hundred cases. I have great confidence, therefore, that I preserved the matter genuine, and in that state brought it to Dr. Gantt, of this place, on my return, from whom I obtained the matter I now send you, taken yesterday, from a patient of the eighth day. He has observed this rule as well as myself. In my neighborhood we had no opportunity of obtaining variolous matter, to try by that test the genuineness of our vaccine matter; nor can any be had, or Dr. Gantt would have tried it on some of those on whom the vaccination has been performed. We are very anxious to try this experiment for the satisfaction of those here, and also those in the neighborhood of Monticello, from whom the matter having been transferred, the establishment of its genuineness here will satisfy them. I am, therefore, induced to ask the favor of you to send me in exchange, some fresh variolous matter, so carefully taken and done up, as that we may rely on it; you are sensible of the dangerous security which a trial with effete matter might induce. I should add that we never changed the regimen nor occupations of those inoculated; a smither at the anvil continued in his place without a moment's intermission, or indisposition. Generally it gives no more of disease than a blister as large as a coffee-bean produced by burning would occasion. Sucking children did not take the disease from the inoculated mother. These I think are the most material of the observations I made in the limited experiment of my own family. In Aikin's book, which I have, you will find a great deal more. I pray you to accept assurances of my esteem and respect.

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*Life and Letters of John Coakley Lettsom, London, 1817.

(Signed) "THOS. JEFFERSON.

"Mr. John Vaughan."

In conclusion, it is worthy of remark how very completely the mission of Waterhouse was accomplished. Through his *direct* means vaccination was introduced not only in Boston but in a very large proportion of the other cities and towns of America. Those not *directly* supplied with their first *efficient* virus by Waterhouse obtained it through the agency of Jefferson. It is by no means too much to say that Waterhouse and Jefferson were the two men to whom the *introduction* of vaccination in America was *wholly* due. However actively many, as Coxe, Seaman, Scofield, and others labored, none even ever nearly approached these two in the success with which they propagated perfect vaccine virus and, directly or indirectly, supplied every considerable city and town of North America, not only with their *first* efficient lymph but, over and over again, with fresh supplies when, as repeatedly happened through ignorance, neglect, or, more frequently, malpractice (mainly the result of following Coxe's teachings, and collecting virus after the appearance, even after the *decline* of the *areola*) the precious *contagium* was lost. It is, of course, not possible here to detail the facts on which this broad assertion is based. Enough that it is not rashly made, but as the result and outcome of careful study of data quite sufficiently full, although not accessible without difficulty. Let the assertion stand as one. When possibly it may come to be disputed it shall be proven.

This remarkable and unique success was due to Waterhouse, and from him Jefferson, being the sole recipient of supplies of virus from England. To very many others, societies as well as individuals, ample supplies from Jenner and many of his earliest English disciples were repeatedly sent, but no record of any authenticity has been discoverable that any but Waterhouse and Jefferson succeeded in perpetuating vaccina of a perfectly normal type such as alone could afford *virus* fit to be used in vaccination. The simple solution of this remarkable and quite exceptional success is to be found in the fact that Waterhouse was a true and faithful disciple of Jenner, that Jefferson was equally loyal to the Master and that both religiously observed his "golden rule;" while the practice of a very large proportion of American physicians was unfortunately influenced by teachings which criticised and even ridiculed that rule; teachings which have not, even yet, fulfilled all their mission of evil and injury to the cause of vaccination in America."—*Martin.*

INTRODUCTION OF VACCINATION INTO NEW YORK, UNITED STATES OF AMERICA.

The value of the labor of Dr. Jenner and Dr. Waterhouse,were acknowledge by the physicians of New York, and more especially by Dr. Valentine Seaman, Edward Miller, Wright Post, Samuel Borrowe, Samuel Scofield, Samuel L. Mitchell, were appreciated in the first years of the nineteenth century; and they induced a number of the prominent citizens of New York, impressed with the importance of substituting the inoculation of the vaccine disease for that of the small-pox, to form an association, and to contribute to the establishment of a public institution, to *extend the advantage of vaccine inoculation to the poor;—to maintain a permanent supply of genuine matter for the use of that community, and to disseminate a knowledge of vaccine inoculation among the physicians of the adjacent country.*

After public meetings, held by the contributors for the purpose, they formed and adopted a constitution suited to their design; and then proceded in pursuance of the constitution, to elect the officers of the institution, when the following gentleman were elected Directors: James Watson, Samuel Browne, John Reese, Robert Browne, Samuel L. Mitchell, Isaac Hicks, Gilbert Aspinwall, William Moore, Thomas Buckley, Samuel Miller, Willet Seaman, Andrew Cock, James Robertson; Thomas Franklin, Treasurer; Adrian Hegeman, Secretary.

The directors made choice of the following gentlemen to perform the various duties assigned to their office by the constitution: James Watson, President; Gilbert Aspinwall, Vice President.

Medical Board.—Valentine Seaman, Edward Miller, Wright Post, Samuel Browne; Samuel Scofield, Resident Surgeon-

A suitable apartment was obtained and the Medical Board commenced vaccine inoculation.

At a meeting of the contributors the following resolution, moved by Mr. Samuel Browne, was unanimously adopted, viz:

"*Resolved*, That in testimony of the high estimation in which this meeting of contributors hold the philanthropic and able exertions of Edward Jenner, M. D., F. R. S., etc., of London, and Benjamin Waterhouse, M. D., professor of practice in the University of Crambridge, in Massachusetts, relative to the inoculation of the Kine-Pock, they are hereby appointed perpetual honorary directors of this Institution."—*Medical Repository, vol. 5, New York*, 1802, *p.* 346-7.

The Medical Profession of the United States were deeply indebted to the learned and eloquent editors of the Medical Repository, for the first full and scientific reviews of the discoveries of Jenner, and the works of Pearson, Woodville and others.

Drs. Samuel Latham, Mitchell, Edward Miller, and Elihu H. Smith, published an account of Dr. Jenner's "Inquiry into the causes and effects of the variolæ vaccinæ," in the second volume of the Medical Repository, p. 244, third edition.

Letters from Dr. Pearson, as well as accounts of his work and that of Dr. Woodville, were published in the Medical Repository, volume third, pp. 70, 315, etc.

In the same (third) volume of the Medical Repository, p. 310, it is stated that Dr. George Pearson, of London, had transmitted in a letter to Dr. Edward Miller a thread impregnated with the matter of the vaccine disease, for the purpose of inoculation in North America, with a view to its use as a substitute for the small-pox.

The readers of this valuable medical journal are informed as to the progress of vaccine inoculation in Europe and America. (See vol. 4, pp. 88, 176, 204, 321, 322, vol. 5, vol. 4, pp. 410, p. 205, etc.)

The vaccine matter received in New York during 1800, did not succeed according to the expectations of Dr. Edward Miller, and he expressed the opinion that the matter employed was not genuine. *(Medical Repository, vol* 4 *p.* 321.)

For the introduction of vaccination into New York, the people were indebted to the persevering and philanthropic exertions of Doctor Valentine Seaman, who, on the twenty-second of May, 1801, procured virus from the arm of Governor Sargent's domestic, who was vaccinated in Boston by Doctor Benjamin Waterhouse, and fortunately arrived in New York, at the proper period for procuring the virus. With this infection Dr. Seaman inoculated several, and succeeding in communicating the genuine variolæ vaccinæ'

There had been virus received in New York, during the preceding winter, but unfortunately it gave rise to a spurious disease.

In January, 1802, an institution was established in New York for the purpose of vaccinating the poor gratis, and of keeping up a constant supply of the genuine matter. In this establishment Samuel Scofield,* M. D. was appointed resident surgeon. This institution was subsequently connected with the New York City Dispensary, and a physician appointed for the express purpose of vaccinating such as applied for that purpose.

Dr. V. Seaman, Physician of the Kine-Pock Dispensary, reported to the trustees on the third of January, 1807: "That the practice of vaccination has been regularly attended to, and that by means of this establishment, nearly eleven hundred have been inoculated; not one of whom has been known since to have taken the small-pox.

"During the fifteen years immediately preceding the introduction of the vaccine disease into this city, it appears, by a regular record preserved by the sextons, 5,756 persons were interred in the cemeteries of St. Paul's and Trinity, of which 610, which is upwards of the tenth part of the whole number, had died under the immediate operation of the small-pox. From the public obituary, since established by the corporation, we find that in the years 1805 and 1806, 4,595 persons have died in this city; 110 only, which is less than one-fortieth part, was by the small-pox; where it may be fairly interred, that during the last two years, the practice of vaccination has preserved 276 of our fellow citizens from falling victims to that most loathsome of all human maladies, while it does not form a single item on the bills of mortality. If individuals would attend reasonably to partake of the means now offered for their protection, it is more than probable, that in a little time the small-pox would only be heard of in hisiory, and our country be freed from one of the most dreadful scourges."—*The Medical Repository, vol.* 4, *New York*, 1807, *p.* 430.

In order to determine the value of vaccination in New York, which from its geographical position, its extended commercial connections, and the vast multitudes of foreign emigrants passing through this great gate-way of the North American Continent, was the most exposed of all cities to the ravages of this pestilence, I consolidated from the official reports of this city the mortality during the period of half a century, immediately following the introduction of vaccination.

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*"A Practical Treatise on Vaccine or Cowpock' by Samuel Scofield, M. D., one of the physicians of the New York City Dispensary, and first Resident Surgeon of the New York Institution for the Inoculation of he Cowpock." Embellished with a colored engraving representing a view of the local affection in its differ *nt stages.* New York: Printed by Southerick & Pelsue, for Collins & Perkins, 1810.

Total Deaths from all Causes, and from Small-Pox, Measles, Scarlet Fever and Phthisis-Pulmonalis in the City of New York during a Period of Fifty Years, 1804-1853.

YEAR.	TOTAL DEATHS FROM ALL CAUSES.	DEATHS FROM			
		Small-Pox.	Measles.	Scarlet Fever.	Phthisis Pulmonalis.
1804	2125	164	2	14	499
1805	2344	62	0	4	462
1806	2225	48	0	4	354
1807	2312	29	1	2	464
1808	2014	62	64	4	429
1809	2108	66	2	9	413
1810	2167	4	2	1	562
1811	2524	117	2	0	595
1812	2553	21	9	0	669
1813	2283	2	35	1	562
1814	1974	2	15	1	572
1815	2507	94	18	0	618
1816	2739	179	19	0	678
1817	2587	14	20	3	574
1818	3265	19	18	0	591
1819	3176	0	10	5	577
1820	3515	0	74	5	625
1821	3542	0	109	3	715
1822	3231	0	1	1	624
1823	3444	18	117	2	683
1824	4341	394	100	3	730
1825	5018	40	53	10	843
1826	4973	58	31	24	820
1827	5181	149	172	4	889
1828	5181	93	28	11	906
1829	5094	16	91	188	880
1830	5537	176	12	246	974
1831	6363	224	39	258	1033
1832	10389	89	290	221	1514
1833	5746	25	38	179	1251
1834	9082	233	212	418	1471
1835	7082	351	82	174	1437
1836	8009	173	442	202	1514
1837	3732	164	288	579	1458
1838	5053	91	79	257	1225
1839	7953	68	133	158	1318
1840	8474	332	185	391	1296
1841	9115	200	113	360	1470
1842	9176	181	60	416	1339
1843	8693	117	118	223	1503
1844	8875	21	51	224	1428
1845	10483	125	136	63	1659
1846	11318	141	17	114	1690
1847	15788	53	275	142	1696
1848	15919	544	77	93	1869
1849	23773	396	125	266	2086
1850	16978	231	324	311	1922
1851	21924	562	320	627	2374
1852	21601	407	246	613	2487
1853	22702	656	134	454	2739
Total	364698	7131	4749	8398	55265

From the preceding statistics we gather that out of a total of 364,698 deaths from all causes (males, 198,432; females, 166,266; excess of males 32,166 or 19.35 per cent), occurring in New York during 50 years, 1804–1853 inclusive, small-pox occasioned only 7131 deaths.

During the same period measles occasioned 4749 deaths and scarlet fever 8398; these two diseases occasioned 13,147 deaths, or nearly twice the number caused by the more fatal pestilence small-pox.

Phthisis pulmonalis caused 55,265 deaths or about eight times the number credited to small-pox.

We must attribute this result, that is the comparatively small mortality from small-pox to vaccination Some estimate of the number of emigrants pouring in from Europe may be formed from the fact that from May 5, 1847, to the end of 1853, there arrived at New York, 1,627,174 white emigrants,

INTRODUCTION OF VACCINATION INTO PHILADELPHIA, PENNSYLVANIA.

In Philadelphia, Dr. John Redman Coxe made most laudable efforts to introduce the inoculation of the cow-pox into Philadelphia, Penn., and in 1802, he published his "*Practical Observations on Vaccination or Inoculation for the cow-pock.*" in which he duly appreciated the value of the discovery of Edward Jenner, and endeavored with a zealous and benevolent warmth, to recomemnd this safe and easy substitute for the small-pox.

Most of the leading facts and principles concerning the cow-pock, known and ascertained at the time, are noticed in this publication.

Much discussion and difference of opinion having arisen on the question how late in the disease it may be allowed to take matter for the purpose of inoculation, Dr. Coxe could not entirely agree with Dr. Edward Jenner, who enjoined it upon inoculators to consider the appearance of the efflorescence, as a sacred boundary which might not be trangressed. Dr. Coxe was inclined to believe, that while the fluid in the vesicle continues limpid, and the scab is not too far advanced, no inconvenience will arise from the use of the matter; and the point of time beyond which the matter is not ordinarily to be taken he supposes may properly be eight times twenty-four hours.

Dr. Coxe records his belief in the efficacy of vaccination in correcting the scrofulous diathesis, in removing certain cutaneous diseases, and curing whooping-cough and deafness.

Dr. John Redman Coxe published farther observations on vaccination in 1804. (See the Medical Repository, Second Hixade, vol. 1; New York, 1804; p. 122.)

Mr. Bryce, of Edinburgh, in his *Observations on the Cow-pox*, published in 1802, advocated the use of *the crust of the vesicle* after it falls from the arm; and also proposed a mode of ascertaining whether the constitution had been affected by the vaccine virus, by a double inoculation, the second being performed some days after the first.

Wm. Farquharson, James Bryce, A. Gillespie and J. Abercrombie, of the Vaccine Institution of Edinburgh, after recording 7140 vaccinations from February, 1801, to February, 1807, state that "by using the crust, the cow-pox has frequently been renewed at this institution, when the fluid virus had been lost, from the non-attendance of the children at the proper period of taking it."

From a report of Mr. Shoolbred, of Calcutta, it is shown that "by this mode of using the crust, the cow-pox had been renewed at the different out-stations in the Province of Bengal, at Prince of Wales Island, and at Port Marlborough, when the virus had been lost, and every means of transmitting it from Calcutta had proved ineffectual."—*Edinburgh Medical and Surgical Journal*, 1807*; vol.* 3, *p.* 253.

The following tables, consolidated from official sources, will present in a clear light the relations of small-pox to other diseases in Philadelphia; and will also clearly demonstrate the protective power of vaccination. These figures are of special value and force, when compared with those of London, England, previously recorded, illustrating the mortality occasioned by small-pox in that city during the seventeenth and eighteenth centuries, before the introduction of vaccination, when the population approximated to that of Philadelphia, during the period under observation:

Deaths in Philadelphia, Penn., from Small-Pox, each year, from 1807 *to* 1882, *inclusive, with the Average Population of each year and Deaths to every* 1000 *Persons Living.*

Years.	Population.	Deaths from Small-Pox.	Deaths from Small-Pox in 1000 Living Persons	Years.	Population.	Deaths from Small-Pox.	Deaths from Small-Pox in 1000 Living Persons
1807		32	0.27	1845		190	0.73
1808	111,210	145	1.28	1846		251	0.61
1809		101	0.90	1847	408,762	9	0.02
1810		34	0.30	1848		100	0.24
1811		117	1.04	1849		152	0.37
1812				1850		40	0.09
1813				1851		216	0.52
1814				1852		427	1.04
1815				1853		57	0.13
1816		97	0.77	1854		40	0.09
1817		52	0.30	1855		275	0.67
1818		8	0.05	1856		390	0.68
1819	137,097	1		1857		65	0.11
1820				1858	565,529	7	0.01
1821				1859		2	0.003
1822				1860		57	0.10
1823		160	1.16	1861		758	1.34
1824		325	2.37	1862		264	0.46
1825		6	0.04	1863		171	0.30
1826		3	0.01	1864		260	0.45
1827	188,797	100	0.52	1865		524	0.92
1828		107	0.56	1866		144	0.21
1829		81	0.42	1867		48	0.07
1830		86	0.45	1868	674,022	48	0.07
1831		14	0.07	1869		6	0.008
1832		37	0.19	1870		9	0.01
1833		150	0.82	1871		1,879	2.78
1834		195	1.03	1872		2,585	3.83
1835		101	0.53	1873		39	0.05
1836		76	0.33	1874		15	0.02
1837		79	0.34	1875		54	0.08
1838	268,034	42	0.16	1876		407	0.45
1839		5	0.01	1877	846,980	155	0.17
1840		63	0.24	1878			
1841		259	1.00	1879		6	0.006
1842		156	0.60	1880		429	0.05
1843		36	0.13	1881		1,336	1.57
1844		17	0.06	1882		314	0.03
Total deaths from Small-pox for 76 years						13,813	

From the preceding table it is established that during the past seventy six years small-pox has occasioned deaths in Philadelphia in sixty-eight years, and that in only eight years was the disease entirely absent; and that, notwithstanding its almost constant presence, it occasioned only 13,812 deaths during the entire series of years embraced in the table. During the first thirty-nine years, 1807–1845 inclusive, small-pox occasioned 2,281 deaths, and in the last thirty-seven years, 1846-1882 inclusive, 11,532 deaths; total seventy-six years, 13,813.

The apparent increase of deaths during the last seven years from small-pox must be referred chiefly to the increase of population; during the first thirty-nine years (1807-1845) the population of Philadelphia ranged from 111,210 to 268,034. and during the last thirty-seven years (1846-1882) from 408,762 to 846,980.

That small-pox has played but a secondary part in the mortality of Philadelphia, will be evident from a comparison with the following statistics:*

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*Health Officer's Annual Report, City of Philadelphia, 1882. Philadelphia, 1883; p. 201, p. 2.

Table showing the ratio of deaths, with population in Philadelphia, Pennsylvania, during the past twenty-two years.

YEARS.	Population.	Deaths from all causes.	Deaths to 1000 persons.	Persons living to one death.
1861	576,408	13,540	23.49	42.57
1862	587,287	13,864	23.60	42.36
1863	598,166	14,220	23.73	42.06
1864	608,045	15,875	26.10	38.30
1865	618,924	15,633	25.25	39.59
1866	620,803	15,362	22.80	40.99
1867	640,682	12,660	19.76	50.60
1868	651,501	13,391	20.39	48.65
1869	662,440	13,428	20.27	49.33
1870	†674,022	15,317	22.72	44.00
1871	700,000	15,485	22.12	45.20
1872	725,000	15,238	26.19	38.18
1873	750,000	15,224	20.29	49.26
1874	775,000	15,987	19.66	50.26
1875	800,000	17,805	22.25	44.93
1876	825,594	18,892	22.88	43.69
1877	850,856	16,004	18.81	53.16
1878	876,118	15,743	17.97	55.65
1879	901,380	15,473	17.17	58.25
1880	†846,980	17,711	20.91	47.82
1881	868,000	19,515	22.48	44.47
1882	886,539	20,059	22.62	44.19

Note—†United States census, the intervening years, population estimated.

Total Deaths from Diphtheria and Scarlet Fever in Philadelphia, Pennsylvania, during the past Fifteen Years—1868-1882.

YEARS.	Total Deaths Diphtheria.	Total Deaths Scarlet Fever	YEARS.	Total Deaths Diphtheria.	Total Deaths Scarlet Fever.
1868	119	224	1876	708	328
1869	182	799	1877	458	379
1870	172	953	1878	464	554
1871	145	262	1879	321	336
1872	150	174	1880	323	291
1873	110	319	1881	457	486
1874	170	461	1882	933	310
1875	652	1,032			

*Health Officer's Annual Report, 1882, p. 4.

Total Deaths from Consumption, Typhoid Fever, Scarlet Fever and Small-pox in Philadelphia, Pennsylvania, during Twenty-one Years—1862-1882.

YEAR.	DEATHS FROM				YEAR.	DEATHS FROM			
	Consumption.	Typhoid fever.	Scarlet fever.	Small-Pox.		Consumption.	Typhoid Fever.	Scarlet Fever.	Small-Pox.
1862.	1949	654	461	264	1873..	2291	364	319	39
1863.	1953	486	275	171	1874..	2304	491	461	15
1864.	2069	648	349	260	1875..	2359	419	1032	54
1865.	2026	773	624	524	1876..	2776	761	328	407
1866.	1944	381	491	144	1877..	2349	542	379	155
1867.	1947	367	367	48	1878..	2491	404	554	....
1868.	1995	395	224	48	1879..	2481	344	336	6
1869.	1975	373	799	6	1880..	2692	498	291	429
1870.	2308	409	953	9	1881..	2768	645	486	1336
1871.	2337	313	262	1879	1882..	2809	650	310	314
1872.	2330	369	174	2585					

The deaths from typhoid fever alone numbered, in twenty-one years, 10,256.

The remarkable exemption of the citizens of Philadelphia, from the ravages of small-pox during the nineteenth century, may be justly attributed to the faithful advocacy and efficient practice of vaccination, by her learned and philanthropic physicians.

SMALL-POX, AND THE INTRODUCTION OF VACCINATION INTO SOUTH CAROLINA.

Small-pox committed fearful ravages amongst the North American Indians who were protected neither by inoculation nor subsequently by vaccination. Entire nations and tribes disappeared—swept away by small-pox, without leaving any record of their sufferings. This fearful scourge first introduced into Mexico by the Spaniards in 1520, and at various subsequent periods by the French and English colonists, has been the chief agent in the destruction of the aboriginal inhabitants of North America.

The powerful nation of the Katahbas, which, in the early history of South Carolina, numbered several thousand warriors, in 1743 could muster scarcely 400 men. In 1738, small-pox destroyed one half of the Cherokee nation; and the Muskohgees, Uchees, Shawnese, Choctaws, Chickasaws, Natchez, and many other tribes have suffered to an equal extent.

In describing the Sewees of South Carolina, John Lawson says: "These Sewees have been formerly a large nation, though now very much decreased, since the *English* hath seated on their land, and all other nations of *Indians* are observed to partake of the same fate where the *Europeans* come, the *Indians* being a people very apt to catch any distemper they are afflicted withal; the small-pox has destroyed many thousands of these nations, who, no sooner than they are attacked with the violent fevers and the burning which attends that distemper, fling themselves overhead in the water in the very extremity of the disease; which, shutting the pores, hinders a kindly evacuation of the pestilential matter and drives it back, by which means death most commonly ensues—not but in other distempers, which are epidemical, you may find among them practitioners that have extraordinary skill and success in removing those morbific qualities which afflict them."

John Lawson visited Carolina in 1700. *A New* VOYAGE *to* CAROLINA, *containing the exact description of that country, together with the present state thereof, and a Journal of a Thousand Miles, traveled through several Nations of Indians, giving a particular account of their customs, manners, etc. By John Lawson, Gent, Surveyor General of North Carolina. London: Printed in the year* 1709; *p.* 10, *p.* 224.

In another portion of his "New Voyage to Carolina," John Lawson says with reference to the Indians of North Carolina:

"The small-pox has been fatal to them; they do not often escape when they are seized with that distemper, which is a contrary fever to which they ever knew. Most certain, it had never visited *America* before the discovery thereof by the Christians. Their running into the water, in the extremity of this disease, strikes it in and kills all that use it. Now they are becoming a little wiser, but formerly it destroyed whole towns without leaving one Indian alive in the village." p. 223-224.

"A letter from the Governor and Lord's Proprietors, dated March 12, 1697-8, states:

"We have had the small-pox amongst us nine or ten months, which hath been very infectious and mortal; we have lost by the distemper 200 or 300 persons. And on the twenty-fourth of February last, a fire broke out in the night in Charlestown, which hath burnt the dwellings, stores and out-houses of at least fifty families, and hath consumed (it is generally believed) in houses and goods the value of £30,000 sterling." In a subsequent letter, dated April 23, 1698, they state that the small-pox still continued, but was not so fatal as in the cold weather, and that a great number of Indians had fell victims to the disease.*

Dr. David Ramsay is evidently in error when he states that the years 1700 and 1717 were the dates of the two first attacks of small-pox in Charleston; it is evident from the preceding facts that the small-pox prevailed in 1697 and 1698.

Dr. Ramsay also appears to be in doubt about the date of the first appearance of yellow-fever in Charleston, for, in his Medical History of South Carolina from 1670 to 1808, he says that "in the year 1699 or 1700, in addition to the calamities resulting from a desolating fire and a fatal epidemic small-pox, a distemper broke out in Charleston which carried off an incredible number of people, among whom were Chief Justice Bohun, Samuell Marshall, the Episcopal clergyman; John Ely, the Receiver General; Edward Rawlins, the Provost Marshal; and almost one-half of the members of the Assembly. Never had the colony been visited with such general distress and mortality. Some whole families were carried off, and few escaped a share of the public calamities. Almost all were lamenting the loss either of their habitations by the devouring flames, or their friends and relatives by this disease, or the small-pox. Anxiety and distress were visible on every countenance. Many of the survivors seriously thought of abandoning a country on which the judgment of heaven seemed to fall so heavy. Dr. Hewatt, from whom the preceding account is taken, designates this malady by the general appellation of 'an infectious distemper.' It was generally called the plague by the inhabitants. From tradition and other circumstances, particularly from the contemporaneous existence of yellow-fever in Philadelphia, there is reason to believe that this malady was the yellow-fever; and, if so, was the first appearance of that disorder in Charlestown, and took place in the nineteenth or twentieth year after it began to be built.†"

Dr. Frederick Dalcho has definitely fixed the date of this outbreak of yellow fever in Charlestown in the year 1699. Thus this historian says:

"The Rev. Mr. Marshall died in 1699, of a malignant disease which swept off many of the principal inhabitants of Charlestown. This disease was probably the yellow fever which raged at the same time in Philadelphia. In a letter from the Governor and Council to the Lord's Proprietors, dated Charlestown, in South Carolina, January 17, 1699–1700, they state that they had nothing to communicate, but that a most infectious, pestilential and mortal distemper (the same which hath always been in one or more of His Majesty's American plantations for eight or nine years last past), which from Barbadoes or Providence was brought in among us into Charlestown about the twenty-eighth or twenty-ninth of August last past, and the decay of trade and the mutations of your Lordship's public officers occasioned thereby. This distemper, from the time of its beginning aforesaid to the first day of November, killed in Charlestown at least 160 persons, among whom were Mr. Ely, Receiver General; Mr. Amory, Receiver for the Public Treasury; Edward Rawlins, Marshal; Edmund Bohun, Chief Justice. Amongst a great many other good and capital merchants and housekeepers in Charlestown the Rev. Mr. Marshall, our minister, was taken away by the said distemper. Besides those that have died of this distemper in Charlestown, ten or eleven have died in the country, all which got the distemper and were infected in Charlestown, went home to their families and died; and what is notable, not one of all their families was infected by them. This afflictive dispensation of Providence is likewise mentioned in a letter from Isaac Norris, dated November 18, 1699, O. S. It states that '150 persons had died in Charlestown in a few days; that the survivors fled into the country, and that the town was thinned to a very few people.'*

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*An Historical Account of the Protestant Episcopal Church in South Carolina from the first settlement of the Province to the War of the Revolution, etc.; by Frederick Dalcho, M. D., Assistant Minister of St. Michael's Church; Charleston, p. 32.

†The History of South Carolina, from its first settlement in 1670 to the year 1808, in two volumes; by David Ramsay, M. D.; Charleston, 1809; vol. 2, p. 82.

Small-pox appeared again in 1717, and returned in 1732, but in this latter year effectual care was taken to prevent its spreading.

In the year 1738, small-pox was imported in a Guinea Ship, and spread so extensively that there was not a sufficency of persons in health to attend the sick; and many persons perished from neglect and want. There was scarcely an hour in which there had not been one or more deaths.

From a manuscript in the hand-writing and found among the papers of the venerable Thomas Lamboll, who died in 1775, the following particulars are collected relative to this disease.

"It first attracted public notice in May, 1738. In the next month a fast day was appointed by proclamation. Soon after the disease commenced, a report was circulated that tar water was not only a good preparation for recovering, but a preventive of the small-pox. Many barrels of tar were sold and used for that purpose; but the author soon after took the infection and died, and his empirism died with him.

"By an account dated September 30, of the same year, it appears that the whole number of deaths was 411; and the whole number who had taken the small-pox was 2112, of which 833 were whites and 1279 blacks. Of the former, 647 took the disease in the natural way and of them 157 died. Of 188 whites who took the disease by inoculation, nine died. Of the 1279 blacks who took the disease 1023 had it in the natural way, and of them 138 died, the remainder; 253, were inoculated, and of them seven died."

From these facts, as stated by Mr. Lamboll, it appears that of the white persons who took the small-pox in the natural way, nearly one in every four died; but of such as took it by inoculation, the deaths were only one in twenty. Of the negroes who took the disease in the natural way, nearly one in every seven died, but of such as took it by inoculation, the deaths were only one in thirty six.

Dr. David Ramsay, writing in 1808, says, in reference to the preceding facts, that, "It is well known that negroes have the small-pox as bad, if not worse, than white people when the treatment of both is the same. That they fared better than their owners on this occasion must be referred to their being under less restraint with regard to cold air. In treating the small-pox, an excess of care and confinement is much worse than no care or confinement whatever."†

From the same manuscripts of Thomas Lamboll, it appears that on the twenty-first of September, an act of assembly was passed at Ashley ferry against inoculation for the small-pox in Charleston, or within two miles of it after the tenth of October,§ 1738.

Dr. David Ramsay, gives the following account of the introduction of the practice of inoculation into the province of South Carolina during the prevalence of small-pox in Charleston in 1738.

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*An Historical Account of the Protestant Episcopal Church in South Carolina etc. by Frederick Dalcho, M. D. p. 35.

†History of South Carolina. p. 77.

§History of South Carolina. p. 77-78.

Dr. Moybray, a surgeon of a British man of war then in the harbor, proposed inoculation; but the physicians opposed it at first. With the exception of Dr. Martin, they afterwards came into it. Mr. Philip Priolean was the first person in Charleston who submitted to the operation. The success which attended this first experiment encouraged several others to follow the example. The disease soon after abated.

Small-pox appeared again in 1760.

Dr. Frederick Dalcho, records the facts, that; "the twelfth annual meeting of the clergy was held April 16, 1760. Five clergymen were present and eleven were absent. The small-pox raging in town, prevented those who were subject to its influence from attending the meeting. No sermon was preached."

Dr. David Ramsay states, that "about the beginning of the year 1760, the small-pox was discovered in the house of a pilot on White Point; guards were placed round the house, and every precaution taken to prevent the spreading of the disease; but in vain. When the persons first infected at White Point were either dead or well, the house in which they had lain was ordered to be cleaned. In doing this a great smoke was made which, being carried by an easterly wind, propagated the disease extensively to the westward in the line of the smoke. Inoculation was resolved upon and became general.*

"When this practice was first introduced, and for several years after, the inoculators loaded their patients with mercury and tortured them with deep crucial incissions, in which extraneous substances impregnated with the variolous matter was buried. There were then able physicians in Charleston; but they were so mistaken with the proper method of treating the disease that it was no uncommon practice to nail blankets, over the shut windows of closed rooms, to exclude every particle of cool fresh air from their variolous patients, whose comfort and safety depended on its free admission. The consequences were fatal. Charleston was a scene of the deepest affliction. Almost every family was in distress for the loss of some of its members, but so occupied with the attentions to the sick that they could neither indulge the pomp nor the luxury of grief. The deaths from the small-pox was nearly eleven-twelfths of the whole mortality in Charleston. Only eighty-seven died of other diseases, while the deaths from the small-pox amounted to nine-hundred and forty. Of these only ninety-two died under inoculation.

Fifteen hundred persons are said to have been inoculated in one day; and it is certain from the bills of mortality that 848 persons died of the disease who were not inoculated. If we allow that only one in four died, as in the year 1738, the whole number who took the disease in the natural way must have been 3392. Precision in numbers is not attainable; but enough is known and remembered by several persons still alive to prove that the year 1760 was one of the mort melancholy and distressing that ever took place in Charleston.

In the year 1763 the small-pox returned; but as there were few to have it, and inoculation was generally adopted; its ravages were not extensive. For seventeen years after, the small-pox was seldom or never heard of. During the siege of Charleston it was introduced, and immediately after the surrender of the town,on the twelfth of May, 1780, a general inoculation took place. As the cool regimen was then universally adopted, the disease passed on without any considerable loss or inconvenience.

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*An Historical account of the Protestant Episcopal Church p. 134.

" Since the Revolution, all the laws which interdicted the introduction and spreading of the small-pox have been repealed. There have been, of course, some cases of small-pox almost every year, but nothing very general or alarming in any one. A small proportion of those inoculated died or suffered inconveniences from it; but to nineteen of twenty, it was a trifling disorder. This was a great triumph of suffering humanity, but it was short of what followed. In the yeer 1802, vaccination was introduced into Charleston within four years after Doctor Jenner had published its efficacy in preventing the small-pox, though eighteen years had elapsed between the first inoculation in England for the small-pox and the adoption of that practice in Carolina.

This substitute for small-pox (vaccination) was introduced into Charleston by Dr. David Ramsay, who after many trials succeeded in February, 1802, in communicating the disease to his son Nathaniel. From him, originally or remotely, some thousands have received the disease. No case has yet occurred in which a clearly marked case of small-pox has followed a clearly marked case of vaccination. Mistakes have been made with respect to both diseases, and the one has in some instances been communicated to persons who had previously used the seed of the other. From these causes, added to the ignorance and carelessness of some vaccinators, the confidence of a few in the Jennerian discovery has been weakened. But that the real vaccine is a preventive of the real small-pox is as certain, from the testimony and experience of thousands, as that the inoculated small-pox secures against the natural. Thus in the short space of seventy years, the small-pox has been moderated in Carolina from the natural to the artificial. The latter so alleviated by mild treatment, and particularly by the cool regimen, as to become for the most part a trifling disease; and finally an opportunity has been given to avoid the danger and inconvenience of both, by a safe and easy substitute. The future ravages of the small-pox may be fairly put to the account of the carelessness, the ignorance, or the prejudices of the people. [The History of South Carolina from its first settlement, in 1670, to the year 1808; in two volumes. By David Ramsey, M. D.; Charleston, 1809; pp. 78-81.]

Small-pox prevailed epidemically in Charleston during the seventeenth century, in 1698 and 1699; during the eighteenth century, in 1717, 1738, 2112 persons were attacked, of whom 411, or 20 per cent, died; of these 833 were whites, 1669 of whom, or 20 per cent died; among the blacks, 1279 cases occurred, of which 145, or 12.5 per cent were fatal; in 1760 deaths from small-pox 940, only 87 deaths being recorded from all other causes during that year, the deaths from small-pox bearing the frightful proportion of 91.52 per cent to the deaths from all other causes; small-pox again prevailed epidemically in 1763 and 1780.

During the nineteenth century after the introduction of vaccination no extensive epidemics are recorded, up to the time of the great American civil war, 1861–1865.

The absence of small-pox from Charleston during the first sixty years of the nineteenth century during which period vaccination was systematically and intelligently urged and practiced by its learned and accomplished physicians and surgeons, has been acknowledged by the medical profession and also demonstrated by official records.

The truth of the preceding proposition will be illustrated by the following statistics:

Statement of the Deaths in Charleston, South Carolina, from all Causes and from Small-Pox for Thirty-six Years, from 1822 to 1848, Inclusive.

YEARS.	Population.	Deaths.			Proportion of Deaths to Population.		Deaths from Small Pox.		
		Males.	F'males	Total.	One in.	In 100.	White.	Black.	Total.
1822	24,780	537	388	925	26.78	3.72	0	0	0
1823	26,301	432	382	814	32.21	3.10	0	0	0
1824	27,822	656	403	1,059	26.27	3.80	0	1	1
1825	28,233	481	359	840	33.60	2.97	18	34	52
1826	28 644	420	344	764	37.48	2.66	15	14	29
1827	29,055	474	329	803	36.68	2 67	0	0	0
1828	29,466	454	339	793	37.15	2.69	0	0	0
1829	29,877	388	374	762	39.20	2.55	0	0	0
1830	30,289	408	355	763	39.68	2.50	0	16	16
Mean		472	364	836	33.82	2.95	33	65	98
1831	30,187	382	351	733	41.17	2.42	6	36	42
1832	30,085	303	257	560	53.72	1.86	0	0	0
1833	29,982	281	261	542	55.31	1.80	0	0	0
1834	29,879	350	342	692	43.03	2.32	0	0	0
1835	29,776	365	299	664	44.50	2.23	0	0	0
1836	29,673	639	533	1,172	25 31	3.95	0	0	0
1837	29,570	352	278	630	48.52	2.06	0	0	0
1838	29,467	828	381	1,209	24.36	4.10	0	0	0
1839	29,364	502	354	856	34.30	2.91	0	0	0
1840	29,261	361	244	605	46.36	2.18	1	1	2
Mean		433	330	766	38.80	2.57	7	37	44
1841	28,910	336	258	594	50.35	1.98	0	1	1
1842	28,559	307	243	550	51.83	1.92	0	0	0
1843	28,208	368	329	697	40.47	2.47	4	46	50
1844	27,857	282	271	533	50.37	1.98	0	0	0
1845	27,596	272	298	570	48.40	2.06	0	0	0
1846	27,155	326	281	607	44.72	2.23	0	0	0
1847	26,803	272	276	548	48 89	2.04	0	0	0
1848	26,451	322	292	614	43.05	2.32	1	0	1
Mean		310	281	592	46.77	2.13	5	47	52

Swine-Pox occasioned amongst the whites one death in 1824 and one death in 1825; amongst the blacks, one death in 1827 and one death in 1837; total deaths from Swine-Pox in Charleston, South Carolina, during twenty-six years (1822 to 1848 inclusive), four.

During the same period vaccination caused one death amongst the whites in 1844, and one death amongst the blacks in 1842 and one death in 1844; total deaths from vaccination in Charleston, South Carolina, during twenty-six years (1822 to 1848 inclusive), three.

On the other hand Small-Pox caused deaths—whites 45, blacks 149; total, 194.

From all the data which we have been able to obtain relative to the mortality of Charleston, South Carolina, subsequent to 1840, we extract the following concerning small-pox and vaccination.

YEARS.	Population.	Total Deaths.	Proportion of Deaths to Population.	Vaccination.	Deaths from Small-Pox.
1844	29,963	553	54.13	2	0
1845	29,963	570	52.18	0	0
1846		607	47.71	0	0
1847		543	54.74	0	0
1848		617	43.11	0	0
1849		798	36.34	0	0
1850	No report.				
1851		922	44.46	0	4
1852		1,582	27.81	0	0
1853	No report.				
1854		1,876	23.49	0	59
1855		1,088	45.94	0	0
1856	No report.				
1857		1,237	42.37	0	1
1858		1,922	26.14	0	0
1859		1,033	48.40	0	0
1860		1,472	37.38	0	0
1861		1,380	35.09	0	0
1862, 1863, 1864	No reports.				
1865		2,068	9.70	0	138

Of the 138 deaths occasioned by small-pox in 1865, eleven were whites and 137 colored. That small-pox continued to prevail is indicated from the report of the Health Officer for 1866.

We have in our possession the report of the Registrar of Charleston, South Carolina, for only three months of 1876, April, May and June; during these months the deaths from small-pox were, whites thirteen, colored eighty-three; total ninety-six.

During the Federal occupation, after the fall of Charleston, near the close of the Confederate struggle for independence, the colored people congregated in the city, and small-pox introduced, by the Federal forces, prevailed to a great extent, but the exact data is not in our posession to show the actual mortality occasioned by this disease:

Some conception of the condition of affairs in Charleston may be gathered from the following extracts from the journals of 1867.

SANITARY STATISTICS OF SOUTH CAROLINA.

Through the kindness of the Medical Director of the Freedmen's Bureau for South Carolina, Brevet Colonel and Surgeon M. K. Hogan, we have been permitted to examine the Sanitary Reports of Refugees and Freedmen, who have been receiving medical treatment from the officers of the Bureau. We procured these statistics in order to examine, from the most reliable data within reach, into the general condition of health prevailing throughout the State, as well as in this city. We did this because there has been within the past few weeks what we believed to be exaggerated rumors regarding the amount of sickness and mortality in the State. As we have before stated, "refugees" here means indigent whites. These reports include the Health Department of the City of Charleston. The following posts are represented: Charleston, Beaufort, Port Royal Island, James' Island, Wadmalaw, Georgetown, Hamburg, St. James' Santee, Edisto Island, Mount Pleasant, Summerville, Columbia, Hopkins' Turnout, Hilton Head, St. Paul's Parish, Legareville, St. Thomas' Parish, Monk's Corner, and Darlington. Some of these posts have lately been discontinued. The reports of the "Refugees," we believe, are principally confined to the white poor of this city, and the freedmen, for the most part, are of Charleston and the sea islands.

The reports before us would be of great interest and scientific value if there were any possibility of determining what proportion the number of sick here reported bears to the whole population, from among whom these sick are taken. But this from the nature of the case, it is impossible to ascertain. The numbers purporting to give this information, therefore, are necessarily only of proximate accuracy. We have thought, however, that a comparison of the sanitary condition of the present summer, with that of last year, and of the white with the colored population, may not be without interest to the profession, or even to the public.

The consolidated reports of the several posts in South Carolina, under the charge of the Freedmen's Bureau (including the poor white and black of Charleston), present us with the following statistics:

REFUGEES.

	1866.			1867.		
	May.	June.	July.	May.	June.	July.
Total under charge of Bureau	2,825	2,825	2,925	4'184	4,439	4,437
Total number treated during month	585	546	601	889	626	98
Died during the month	12	17	8	13	7	8
Small-pox and Varioloid	26	9	1			
Deaths from same		1				
Typhoid fever	2	3	5	1	3	2
Deaths from same		2				
Malarial fevers	81	112	169	132	173	300
Deaths from same		3				2
Consumption	6	9	13	12	7	5
Deaths from same	2		1	2	2	
Scrofula	1	1	6	1	2	4
Deaths from same						

FREEDMEN.

	1866.			1867.		
	May.	June.	July.	May.	June.	July.
Total number under charge of Bureau	39,099	3,9096	33,285	116,135	116,135	116,974
Total number treated during month	5,356	5,536	4,522	5,716	5,641	7,883
Died during the month	87	67	63	70	66	113
Small-pox and Varioloid	176	271	226			
Deaths from same	20	15	10			
Typhoid fever	41	69	89	10	9	21
Deaths from same	6	5	3	2	3	6
Malarial fever	603	1,190	1,840	686	1,228	3,390
Deaths from same	5	8	5	2	7	23
Consumption	27	28	33	31	37	33
Deaths from same	5	3	4	14	7	8
Scrofula	40	35	32	53	64	63
Deaths from same		1		1		2

Upon an examination of the foregoing tables it will be seen that the amount of sickness this year has been greater, both among black and white, in May, June and July, than during the corresponding months of last year; and this difference, we have every reason to believe, is due to the greater preponderance this year of the different forms of maleria fever.

Small-pox, it is known, was epidemic here during the winter months of 1866—'67, and the period embraced in the above reports bring us to the close of the epidemic cycle. The disease was very fatal, but during the summer months, as usual, its virulence abated, and we hence find that but few whites died from it. The number of deaths among the freedmen was greater—11 per cent. in May; 6 per cent. in June, and about 4 in July; while among the whites, during the three months, the deaths form only 3 per cent. of the cases. There is now not a single case of small-pox in the State of South Carolina that we know of, nor has there been for months.

Typhoid fever did not prevail to any alarming degree either last year or this. We have only sixteen cases reported among whites, two of which, or twelve and one-half per cent. died. Among the freedmen, we note 179 cases last year, with fourteen deaths, and only forty cases, with eleven deaths, this year. The percentage of mortality last year from this disease was about eight per cent., and this year twenty-seven per cent. of the cases resulted fatally, a very large mortality, if the statistics may be relied upon.

The numbers of cases of the different forms of malarial fevers reported are not greatly in excess this year over last. It is true the aggregate of cases is much larger, but it should be observed that, both among white and black, the number of those enjoying the benefit of medical care from the Bureau is larger this year than it was last. The percentage of malarious diseases this year and last, calculated from the whole number of cases treated, is as follows:

FREEDMEN.	1866.	1867.	REFUGEES.	1866.	1867.
May	.10	.12	May	.14	.15
June	.21	.21	June	.20	.27
July	.33	.43	July	.28	.30

We find here, with all the uncertainty and accidents to which statistics are subject, a striking coincidence, in the similarity of the proportion these malarious diseases hold to the entire number of diseases reported, in the two years under consideration.

Consumption and scrofula, we believe, are not common diseases in this climate. During the three months under consideration, in 1866 and 1867, we have 52 cases of consumption reported among whites, with 7 deaths, or 13 per cent. Among the freedmen, during the same period, we have 189 cases and 41 deaths or 12 per cent. The percentage of cases of consumption among whites, calculated on the number of persons under the charge of the Bureau, was .014, or nearly one and a half per cent., and among the freedmen .002, only one-fifth of one per cent., a very small fraction. Of scrofula only 15 cases are reported among whites, and 287 among the freedmen.

On the whole, as far as we are able to judge from these reports, we should say that the sanitary condition of South Carolina is good—much better than is supposed by those who have not examined the subject.

Perhaps, in conclusion, it may be well to state that there has not been this year a single case reported of any epidemic disease within the limits of this State. There has been no small-pox, not a single case of yellow-fever, cholera, or even breakbone-fever, reported this year; and considering the lateness of the season, we think our people may enjoy a reasonable hope of immunity from epidemic during the remainder of the year.

The following statistics of deaths by small-pox, in Charleston, South Carolina, during the fifteen years immediately following the American Civil War, have been furnished by the Registrar.*

Deaths from Small-Pox in Charleston, South Carolina, during the Fifteen Years 1865 *to* 1879

	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	Total Whites.	Total Colored.	Total White and Colored
Whites	11	37	....	0	0	0	0	1	8	3	0	0	0	0	0	60		
Colored	127	239	4	0	0	0	0	6	98	32	0	6	0	0	0		512	
Total..	138	276	4	0	0	0	0	7	106	35	0	6	0	0	0	60	512	572

The marked increase of small-pox amongst the colored people after the Civil War was referable to the sudden liberation from slavery, and the consequent freedom of action, as well as to the neglect of vaccination.

From the preceding facts, it is evident that Charleston, South Carolina, was protected from the ravages of small-pox by the introduction of vaccination in 1802 by Dr. David Ramsey, and that the immunity of this city from this loathsome pestilence during the first sixty-four years of the nineteenth century must be attributed to the earnest and philanthropic labors of her accomplished physicians and surgeons in the earnest advocacy and skillful practice of vaccination.

SMALL-POX AND VACCINATION IN GEORGIA.

The early medical history of Georgia, during the eighteenth century, embracing a period of almost sixty-seven years, has never been written; but we are convinced after careful research that this province and State has ever enjoyed the benefits of the professional skill and labors of educated, accomplished and philanthropic medical men. During the nineteenth century, no State of equal white population in the American Union can produce a more distinguished array of learned and skillful surgeons and physicians, amongst whom may be named Drs. Waring, Richardson, Kollock, Bullock, Arnold, West and Harris, of Savannah; Dr. Harden, of Liberty county; Dr. Anthony, Dr. Paul F. Eve, L. A. Dugas, Lewis D. Foard, Joseph Eve, and Henry F. Campbell, of Augusta, Georgia; and Dr. Long, the discoverer of the Anæsthetic effect of Sulphuric Ether, of Athens, Georgia.

The first authentic notice of the presence of small-pox in Georgia which has been recorded (although the disease was undoubtedly present at other times), was in the year 1779.

The failure of the allied arms to capture Savannah, and the mutual defeat and withdrawal of the French and American troops, left Georgia in a worse condition than ever; and it seemed almost as if her political existence was at an end.

The royal government was re-established and Sir James Wright issued his proclamation, dated Savannah, the twentieth of October, 1779.

The first care of Sir James Wright was to put Savannah into a proper condition; for it had been so shattered by the destructive fire of the French and Americans, and by the wanton use of the troops, as well as by the necessary demands of the siege, that it was in a deplorable state. The churches and public buildings had been used for depots, and hospitals and barracks; private dwellings had been converted into mess-halls and officers' quarters; fire had laid waste some squares of buildings; others had been pulled down, to use the materials in different parts of the fortifications; others had been rendered tenantless by the battering balls; and there was scarcely a house in town which had not been made to suffer, outside or in, in consequence of crowding together so many of the inhabitants, with soldiers, seamen, and negroes, within the narrow limits of the entrenchments.

Scarcely had the town put on the aspect of order and cleanliness, before the SMALL-POX, broke out and produced great consternation amongst the inhabitants and soldiers. Inoculation was at that time but little practiced, and only then after an order obtained for that purpose from the Governor's Council, who generally refused to grant the order, except the disease had already broken out in the houshold desiring this preventive treatment.

The exact date at which vaccination was introduced into Georgia is not known, but it was probably about the same time (1802) that it was practiced by Dr. David Ramsey in Charleston, South Carolina.

Many of the older citizens, who were known to me in my boyhood had been inoculated for the small-pox before the introduction of Dr. Jenner's method.

The following records of the mortality occasioned by small-pox, in Savannah and Augusta, Georgia, which I have consolidated from the original records, will show that the small-pox was almost wholly absent from the two largest and most important cities of Georgia, during the first sixty years of the nineteenth century; and that its appearance and prevalence was referable to the assemblage of large bodies of troops during the American civil war, and the liberation of the negro slaves:

Deaths from all Causes and from Small-pox amongst the White Population of Savannah, Ga., during a period of fifty years, 1804-1853, *inclusive.*

Year.	Deaths from All Causes.	Deaths from Small-Pox.	Year.	Deaths from All Causes.	Deaths from Small Pox.	Year.	Deaths from All Causes.	Deaths from Small-Pox.
1804	207	1	1824	136	0	1844	247	0
1805	238	0	1825	126	0	1845	229	0
1806	159	0	1826	235	0	1846	240	0
1807	230	0	1827	221	0	1847	210	0
1808	219	0	1828	146	0	1848	298	0
1809	183	0	1829	209	0	1849	357	0
1810	163	0	1830	159	0	1850	384	0
1811	312	0	1831	149	0	1851	414	0
1812	296	0	1832	216	0	1852	642	0
1813	214	0	1833	202	0	1853	470	0
1814	300	0	1834	197	1			
1815	233	0	1835	228	1	Total 10 years, 1844-1853..		0
1816	272	0	1836	249	0	Total 20 years, 1824-1843..		2
1817	461	2	1837	358	0	Total 20 years, 1804-1823..		3
1818	211	0	1838	331	0			
1819	510	0	1839	367	0	Total deaths from Small-pox in Savannah, Ga., during fifty years, 1804-1853		5
1820	817	0	1840	380	0			
1821	384	0	1841	305	0			
1822	291	0	1842	272	0			
1823	288	0	1843	256	0			
Total 20 years..		3			2			

During a period of fifty years, 1804–1843, inclusive, in Savannah, Ga., the total deaths from all causes numbered 14,322, and of this number small-pox occasioned five. The white population in 1804 was 2799, in 1808, 3010; 1840, 5888; 1843, 7250; 1850, 8395.

Total Deaths from All Causes, and from Small-Pox, in the White and Colored Population of Savannah, Georgia, during a Period of Sixteen (16) *Years,* 1854 *to* 1869, *inclusive.*

YEARS.	WHITES.		BLACKS AND COLORED.		WHITES, BLACKS AND COLORED.	
	Total Deaths from All Causes.	Total Deaths from Small-Pox.	Total Deaths from All Causes.	Total Deaths from Small-Pox.	Total Deaths from All Causes.	Total Deaths from Small-Pox.
1854	1,221	0	308	0	1,529	0
1855	433	0	292	0	725	0
1856	466	0	297	0	765	0
1857	376	0	264	0	640	0
1858	592	0	262	0	854	0
1859	430	0	273	0	703	0
1860	474	0	282	0	756	0
1861	563	0	269	0	832	0
1862	555	0	372	0	927	0
1863	459	0	389	0	848	0
1864	747	4	446	0	1,193	4
1865	1,202	13	819	1	2,021	14
1866	530	9	912	8	1,442	17
1867	476	0	594	1	1,070	1
1868	498	1	581	0	1,079	1
1869	423	0	429	0	852	0
Total deaths from small pox during sixteen years in Savannah, Ga., 1854 to 1869	....	27	....	10	....	37

Total deaths from all causes, whites and colored, 1854 to 1869, 16,234.

A careful examination of the mortuary records of Savannah shows that it is difficult to determine the exact number of deaths from yellow fever, during many of the years embraced in the preceding table, containing the deaths amongst the whites from all causes, and the deaths from small-pox, during a period of sixty-six years, and amongst the blacks and colored during a period of sixteen years.

1804—One death is recorded as due to yellow fever in the month of October, whilst inflammatory and putrid fevers caused ten deaths, and remittent fever sixty-five, intermittent one; total seventy-seven; natives fourteen, foreigners sixty-three.

1805—No classification of fevers; 110 deaths being recorded simply as fever, two deaths nervous fever; total 112; natives twenty-two, foreigners seventy-eight.

1806—Remitting fever forty-one, fever and ague eleven, total fifty-two; natives nine, foreigners forty-three.

1807—Fever seventy-two, intermittent five, nervous three; total eighty; natives nine, foreigners seventy-one.

1808—Fever remittent seventy, intermittent seven; total seventy-seven; natives eight, foreigners sixty-nine.

1809—Fever remittent sixty, intermittent one, malignant one, nervous one; total sixty-three; natives nine, foreigners fifty-two, unknown two.

1810—Fever remittent forty-four; inflammatory one; intermittent one; natives eight, foreigners thirty-eight.

1811—Remittent seventy four, bilious malignant four, intermittent two, inflammatory one, putrid one, typhus five; total eighty-seven; natives thirteen, foreigners seventy-three, unknown one.

1812—Fever ninety-three, bilious fourteen, inflammatory six, endemical one, putrid two, nervous one, malignant fever one, black vomit two; total 120; natives twenty-four, foreigners ninety-two, unknown four.

We observe that two cases are recorded as black vomit; and also that fever caused a mortality of 102 in a city of only about 5,300 inhabitants.

The distribution of these deaths by months are as follows, May two, June four, July ten, August eleven, September twenty-nine, October fifty, November five, December five; the rise and decline of the mortality from fevers in 1812 resembled the ordinary progress of yellow fever.

1813—Fever fifty-five, bilious two, intermittent three, inflammatory three, nervous one; total sixty-four; natives nineteen, foreigners forty-five.

1814—Fever 125, bilious putrid four, inflammatory one, typhus one, spotted one, intermittent two; total 166; natives twenty-three, foreigners 138, unknown five.

In this year again the course of mortality from fever resembled that of yellow fever, being January one, March one, May one, June eight, July fifteen, August twenty-five, September fifty-five, October forty-six, November fourteen.

1815—Fever 129, inflammatory two, nervous two; total 130; natives eighteen, foreigners 104, unknown eight.

1816—Fever 134, bilious three, putrid one, intermittent six, typhus one, yellow one; total 146; natives thirty-eight, foreigners ninety-one.

1817—Fever 304, bilious four, inflammatory one, yellow two, typhus two; total 311; natives fifty-seven, foreigners 236, unknown twenty.

Amongst this large number of deaths from fever, only two were indicated as yellow; the deaths by months from fever, were as follows: January four, February five, March two, June eight, July. forty-five, August thirty-seven, September forty-six, October 104, November forty-seven, December thirteen.

1818—Fever seventy-four, nervous two; total seventy-six; natives thirteen, foreigners sixty, unknown three.

1819—Fever 322, black vomit one; total 323; natives thirty-three, foreigners 285, unknown five. The monthly mortality from fever was as follows:

March one, April three, June four, July twenty-four, August twenty-eight, September, sixty-six, October 147, November forty, December nine, total 323.

The first acknowledged and undoubted epidemic of yellow fever in Savannah, Georgia, during the first twenty years of the nineteenth century occurred in 1820.

1820—Fever 626, yellow fever two, black vomit ten, intermittent one; total deaths from fever 649; natives 116, foreigners 502, unknown thirty-one. The deaths from fever were distributed as follows: January four, February four, March one, May three, June fourteen, July thirty-nine, August 110, September 214, October 197, November fifty-three, December ten.

It is remarkable that upon the mortality record, only two cases were recorded as due to yellow fever.

The following table presents the total deaths from fever and other causes in Savannah, Georgia, during a period of fifty years, 1804-1853, inclusive, amongst the white inhabitants:

YEARS.	Total Deaths from Fevers.	Total Deaths from All Other Causes.	YEARS.	Total Deaths from Fevers.	Total Deaths from All Other Causes.
1804	77	130	1829	32	177
1805	112	126	1830	28	139
1806	52	107	1831	17	139
1807	80	150	1832	57	159
1808	77	142	1833	36	166
1809	63	120	1834	34	163
1810	46	117	1835	57	171
1811	87	125	1836	38	211
1812	120	106	1837	100	258
1813	64	150	1838	108	163
1814	166	134	1839	154	213
1815	130	103	1840	124	256
1816	146	126	1841	83	222
1817	313	148	1842	62	210
1818	76	135	1843	91	165
1819	323	187	1844	51	196
1820	649	168	1845	57	172
1821	183	202	1846	60	180
1822	133	158	1847	28	182
1823	109	159	1848	50	148
1824	42	94	1849	71	286
1825	23	103	1850	63	321
1826	62	173	1851	75	339
1827	96	225	1852	202	440
1828	23	123	1853	76	394
Total fifty years				4,888	9,444

Total deaths from all causes, 14,332.

Table—Deaths from Malarial Fever and from Yellow Fever in Savannah, Georgia, During a Period of Sixteen Years, 1854–1869; Whites.

YEAR.	DEATHS.		YEAR.	DEATHS.		YEAR.	DEATHS.	
	Malarial Fever.	Yellow Fever.		Malarial Fever.	Yellow Fever.		Malarial Fever.	Yellow Fever.
1854	115	625	1860	59	0	1866	48	5
1855	60	0	1861	80	4	1867	67	0
1856	86	0	1862	53	0	1868	52	1
1857	55	0	1863	35	0	1869	36	1
1858	76	112	1864	97	14			
1859	49	0	1865	103	1	Total	1,071	763

Table—Deaths from Malarial Fever and from Yellow Fever in Savannah, Georgia, During Sixteen Years, 1854-1869 *; Blacks and Colored.*

YEAR.	DEATHS. Malarial Fever.	DEATHS. Yellow Fever.	YEAR.	DEATHS. Malarial Fever.	DEATHS. Yellow Fever.	YEAR.	DEATHS. Malarial Fever.	DEATHS. Yellow Fever.
1854	23	14	1860	8	0	1866	50	0
1855	9	0	1861	3	0	1867	43	0
1856	40	0	1862	14	0	1868	34	0
1857	5	0	1863	19	0	1869	22	0
1858	7	2	1864	20	2			
1859	9	0	1865	120	0	Total	396	18

The total deaths amongst the whites during the period specified (1856-1869) were 9,445; amongst the blacks and colored, 6,789; grand total whites and blacks, 16,234.

In 1827 sixteen deaths from yellow-fever were recorded, and seventeen deaths from malignant fever; total from yellow and malignant fever, 33. The deaths from these causes were distributed as follows: September, ten; October, nineteen; November, four. Fever was credited with fifty deaths—intermittent, six; nervous, four; typhus, three; total, ninety-six; natives, sixteen; foreigners, seventy-eight; unknown, two.

In 1839, when the yellow-fever prevailed in a fatal form in Augusta, Georgia, yellow-fever does not appear amongst the list of fatal fevers. The deaths from fevers were classified as follows: Fever, 139; intermittent, three; malignant, eleven; nervous, one; total deaths from fevers, 154; natives, fifteen; foreigners, 137; unknown, two.

It is probable that a portion of the deaths (154) recorded as fever and malignant fever, etc., were yellow-fever.

In 1876, during the months of August, September, October and November, yellow-fever caused 896 deaths, and other diseases 455; total, 1,351. The following is the official record as prepared by Dr. William Duncan, and embodied in the annual report of Hon. Edward C. Anderson, Mayor of the city of Savannah for the year 1877.

Deaths from Yellow Fever and other diseases in Savannah, Georgia, dnring the months of August, September, October and November.

1876. Months.	WHITES. Yellow Fever.	WHITES. Other Diseases.	WHITES. Total.	COLORED. Yellow Fever.	COLORED. Other Diseases.	COLORED. Total.	TOTAL. Whites and Colored.
August	35	25	59	2	19	21	80
September	483	66	549	66	137	201	752
October	212	54	266	52	109	161	427
November	41	16	57	5	30	35	92
Total	771	160	981	125	295	420	1,351

Total yellow fever, 896; other diseases, 455; grand total, 1351.

If the deaths from fevers occurring in the months of June, July, August, September, October and November and December in 1820, be regarded as yellow fever (an estimate above rather than below the true number of deaths occasioned by this disease), then we have 637, as the yellow fever mortality of that year; and if we add the deaths from yellow fever in 1854, 639; 1858, 114, and 1876, 896, the total deaths from yellow fever in Savannah, Georgia, during a period of seventy-three years, 1804-1876, would number:

1820	637	1858	114
1854	639	1876	896
Total	1,276	Grand total	2,286

Before the introduction of vaccination a large proportion of the deaths was caused by small-pox, and yet the official mortuary records of the city of Savannah show that, during a period of sixty-six years, 1804 to 1869, the deaths from small-pox reached only forty-two out of a total of deaths from all causes: Whites, 1804 to 1853, 14,332; whites and colored, 1854 to 1869, 16,234; total, 30,566.

Whilst the various forms of fevers destroyed amongst the whites during fifty years, 1804 to 1853, 4,888; whites and blacks, sixteen years, 1854 to 1869, 2,626; total, 7,514.

The statistics of Savannah show that the colored race are far less liable to the various forms of miasmatic fevers and yellow-fever. This immunity does not extend to small-pox, which, on the other hand, proves very destructive to the colored race.

We must attribute the remarkable immunity of the white and black races of Savannah, Georgia, during the nineteenth century, from the ravages of small-pox to the faithful performance of vaccination and revaccination by the medical profession; and the results of their labors in this respect have been placed in bold relief by the record of the preceding mortuary statistics, illustrating the ravages committed by yellow-fever and malarial fever, during the period taken under consideration.

SMALL-POX AND VACCINATION IN AUGUSTA, GEORGIA.

Deaths from All Causes and from Small-Pox, Whites and Blacks, in Augusta, Georgia, during Forty-eight Years, 1818 *to* 1866.

YEARS.	Total Deaths from All Causes.	Deaths from Small-Pox.	YEARS.	Total Deaths from All Causes.	Deaths from Small-Pox.
1818	90	0	1842	71	0
1819	118	0	1843	80	0
1820	126	0	1844	105	0
1821	127	0	1845	139	0
1822	145	0	1846	185	0
1823	109	0	1847	168	0
1824	90	0	1848	236	0
1825	127	0	1849	243	0
1826	117	0	1850	328	1
1827	134	0	1851	363	7
1828	91	0	1852	410	0
1829	94	0	1853	372	0
1830	71	0	1854	538	1
1831	152	0	1855	364	0
1832	104	0	1856	367	0
1833	129	0	1857	421	0
1834	75	0	1858	333	0
1835	105	0	1859	349	0
1836	107	0	1860	395	0
1837	150	0	1861	432	0
1838	95	0	1862	638	0
1839	340	0	1863	687	5
1840	93	0	1864	827	0
1841	55	0	1865	1,490	82

In 1865 the deaths from small-pox amongst the whites was eight, and amongst the colored people seventy-four.

The disease continued to prevail in August, during 1866; we have the record for only the first six months of this year (1866, January, February, March, April, May and June), and during this period the deaths numbered, whites, 37; blacks, 260; total, 297.

The negroes, suddenly set free by the results of the civil war, flocked into the cities to receive Federal aid; and in their destitute, filthy and crowded condition, fell easy victims to small-pox.

During a period of forty-six years, 1817-1864, inclusive, the deaths from small-pox in Augusta, Georgia, numbered only fourteen, notwithstanding that the disease was introduced in 1850-1851, 1854 and 1863. Its suppression must be referred to the untiring efforts of the skillful physicians, in protecting the people by vaccination.

During the year 1865 and the first six months of 1866, forty-five whites and 334 colored people perished by the disease; total, 379.

Since its foundation up to the present date, January, 1884, Augusta has suffered with two epidemics of yellow fever; namely, in 1839 and 1854.

The mortuary records show the following mortality occasioned by yellow fever in Augusta, Georgia:

Deaths by Yellow Fever in Augusta, Ga., 1839.

MONTHS.	Deaths.
July	1
August	27
September	148
October	52
November	16
December	1
Total	245

Deaths by Yellow Fever in Augusta, Ga., 1854.

MONTHS.	Whites.	Colored.	Total.
September	45	4	49
October	52	7	59
November	12	2	14
December	0	0	0
Total	109	13	122

Total deaths from yellow fever in 1839 and 1854, 367.

The small-pox of 1865-1866 (first six months), destroyed 379 lives, or twelve more than the mortality of the yellow fever epidemics of 1839 and 1854, which struck terror into the hearts of the people.

Yellow fever strikes down the most prominent and useful citizens, and concentrates its ravages upon the white race; small-pox since the introduction of vaccination confines its attacks almost exclusively to the unvaccinated, and to the poor and filthy in crowded houses. Hence the former disease excites more terror and alarm than the latter.

INTRODUCTION OF VACCINATION INTO THE POSSESSIONS OF SPAIN IN NORTH AND SOUTH AMERICA.

Father Torribio says, that the small-pox, introduced by a negro slave of Navarez attached to the Spanish forces, in 1520, carried off half the inhabitants of Mexico. Torquemada states, that the Matlazahuatl carried off 800,000 Indians in 1545, and 2,000,000 in 1576; but Alexander Humboldt, justly observes that these numbers must be in a great measure conjectural. He also remarks, that there is an interesting problem to be solved. Was the plague, which is said to have ravaged the Atlantic regions of the United States, prior to the arrival of the Europeans, and which Dr. Rush and his followers consider as the origin of the yellow fever, the same with the Matlazahuatl of the Mexicans?

According to Humboldt,* small-pox, introduced into Mexico in 1520, commits its ravages only every seventeen or eighteen years. In equinoctial countries, like the black vomit and several other diseases, it seems to have regular periods of recurrence; for, although frequently introduced by shipping from Europe, it does not become epidemic but at well-marked intervals. It committed terrible ravages in 1763, and especially in 1779. In that year it carried off more than 9,000 in the City of Mexico alone. The epidemic of 1797 was less fatal, chiefly on account of the attention and zeal with which *inoculation* was propagated. In the city of Valladolid, the capital of Mechoacan, of 6,800 *inoculated*, only 170 died, and many of these had probably been previously infected. In the whole kingdom 60,000 were *inoculated.*[*]

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*Voyage d'Alexandre de Humboldt, et Aime Bonpland. Esai Statisque sur la Nouvelle Espagne, 4 to. Paris, 1808.

Vaccination was unknown at Lima, Peru, till the month of November, 1802. At that period the small-pox prevailed on the coast of the South Sea. A merchant vessel, *Santo Domingo de la Calzada*, put into Lima, on the passage from Spain to Manilla. An individual had had the good sense to send by this vessel vaccine matter to the Philipine Islands. They availed themselves of this opportunity at Lima; and M. Unanue,[†] professor of anatomy and author of a work on the climate and diseases of Peru, vaccinated several individuals by matter brought by the merchant vessel.

No pustule appeared, and the virus appeared either altered or too weak. However, M. Unanue having observed that all the vaccinated individuals had a very mild small-pox, employed this variolous matter to render, if possible, by the ordinary inoculation the disease less fatal. He thus perceived in an indirect way the effects of a vaccination supposed to have failed.

It is also stated by M. Humboldt that in 1802 it was discovered that the cow-pox was known to the peasantry in the Peruvian Andes. A negro slave in the family of the Marquis Valleumbroso was inoculated with small-pox, but ineffectually. They were going to repeat the inoculation, when the young man declared that he was very certain he would never take the small-pox, because in milking the cows of the Cordilleras of the Andes he had had a sort of cutaneous eruption, caused, as the old Indian herdsmen said, by certain tubercles which are sometimes found on the teats of the cow. "Those who have had this eruption," said the negro, "never take the small-pox." The Africans, and especially the Indians, evince great sagacity in observing the characters, manners and diseases of their domestic animals. It is not, therefore, astonishing that after the introduction of diseased cattle into America, the common people should have remarked that the pustules upon the cow's teats should communicate a sort of mild small-pox, and that those who had it should escape the general contagion during epidemics.

In the month of January, 1804, the vaccine inoculation was introduced at Mexico through the activity of Don Thomas Murphy, who brought the virus from North America. This introduction found few obstacles; the cow-pox appeared under the aspect of a very mild malady; and the small-pox inoculation had already accustomed the Indians to the idea that it might be useful to submit to a temporary evil for the sake of evading a greater evil.

Alexander Humboldt affirms, that if the vaccine inoculation, or even the ordinary inoculation, had been known in the New World in the sixteenth century, several millions of Indians would not have perished victims to the small-pox, and particularly to the absurd treatment by which the disease was rendered so fatal.

To this disease the fearful diminution of the number of Indians in California is to be ascribed.

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[*] Fifteen in the hundred died of individuals of all ages, who, without being inoculated, were victims of the natural small pox.

[†] Observaciones sobre el clima de Lima, y sus influencias en los seres organizados en especial, el hombre por el Doctor Don Higolito Unanue, Catedratico de Prima de Medecina, en la Real Universidad de San Marcos, Director del Colegio de Medecina y Cirurgia de San Fernando, Medico Honorario de Camara de S. M.. Socio de la Real Academia Medico Matritense. Proto Medico del Peru, secunda edicion, Madrid, 1815.

The ships of war commissioned to carry the vaccine matter into America and Asia arrived at Vera Cruz shortly after the arrival of Alexander Humboldt.

Don Antonio Valmis, Physician General of this expedition, visited Porto Rico, Cuba, Mexico and the Philippine Islands; and his stay at Mexico, where, nevertheless, the cow-pox was known before his arrival, contributed singularly to facilitate the propagation of this notable preventive of the small-pox. In the principal cities of the kingdom, Vaccin-Committies were formed, who by vaccinating monthly, preserved the virus from being lost.

M. Valmis discovered cow-pox in the environs of Valladolid, and in the village of Atlisco, near Puebla, in the udder of the Mexican cows.

This fact renders the story of the presence of cow-pox in the Peruvian Andes less improbable, for the Hindostan relation of a similar kind was a mere fabrication to impose a belief of their great sagacity.

The persons attached to the expedition of Dr. Francis X. de Valmis, honorary surgeon of the Royal Chamber, were several physicians, with assistants, and twenty-two children, who had not had the small-pox, and were destined to preserve the valuable fluid by a successive vaccination from arm to arm, or one after another in the course of the voyage. They sailed from the port of Corunna, under the direction of Dr. Valmis on the twentieth of November, 1803. They first touched at the Canaries, then at Porto Rico, and from thence proceeded to Carracas. On leaving the port of Laguaira in that province, they separated into two parties, the one sailing for South America, under the care of the sub-director, Dr. Francis Salvani; the other under Dr. Valmis for the Havannahs, and from thence to Yucatan. In this province they again made a division. Dr. Francis Pastor proceeded from the port of Sisal to that of Villahexmosa in the province of Tabasco, to propagate vaccination in the royal city of Chiapa, and as far as Guatemala, passing through a tedious and rough country for 400 leagues to Oaxaca; whilst the other party arriving safely, at Vera Cruz, not only passed through the whole viceroyship of New Spain but the interior provinces, from whence they were to return to Mexico, which was the point of reunion. Having profusely disseminated this preventive from the natural small-pox, through the northern parts of Spanish America, to the coasts of Sonora and Sinaloa; and having established in each capital a central *society* composed *of the highest* authorities and most zealous medical characters, to presreve it as a sacred deposit, for which they were answerable to the King of Spain and posterity, the *Director* determined that this part of the expedition, which had been crowned with success, should carry to Asia the vaccine virus, and having overcome some difficulties, Dr. Valmis embarked at Acapulco for the Philippine Islands.

Dr. Valmis accomplished this passage in little more than two months, taking with him from New Spain twenty-six children to be successively vaccinated; and, as many of them were very small, they were placed under the charge of a matron from the orphan house of Corunna; and in this, as in former voyages, the greatest attention was paid to their cleanliness and comfort. The expedition having arrived at the Philippine Islands, propagated the variolæ vaccinæ through the islands subject to his Spanish Majesty.

Dr. Valmis, having thus closed his philanthropic mission, resolved, with the consent of the Captain-General, to extend the beneficience of his King and the glory of his august name to the utmost confines of Asia.

In consequence vaccination was introduced through the vast Archipelago of the Visayas Islands. When Valmis arrived at Macao and Canton, he succeeded in introducing fresh and active vaccine matter into the Chinese Empire, by the means already pointed out.

After having extended vaccination in Canton as much as possible, under the political regulations of that empire, and leaving its propagation to the English factory in that place, Valmis returned to Macao, and embarked for Lisbon, where he arrived on the fifteenth of August, 1806.

That part of the expedition which was destined for Peru, under the direction of Salvani, was wrecked in one of the mouths of the River Madelaine; but being quickly succored by the natives, the magistrates of the neighborhood and the government of Carthagena, they saved the subdirector, three physicians who accompanied him, and the children, with the fluid in a proper state, which they successfully spread in that port and province. From thence they transmitted it to the Isthmus of Panama, and undertaking the troublesome navigation of the River Madelaine, they passed the time necessary on its respective banks; they penetrated repeatedly into the country to fulfill their commission in the towns of Teneriffe, etc., etc., in the valley of Cucuta, and in the city of Pampelona and other populous places, until they rejoined each other at St. Fee. They gave full information to the medical men wherever they went, and laid down regulations agreeably to the instructions of the director, in order to preserve the vaccine virus, which, from the account of the Viceroy, they communicated to 50,000 persons without one unpleasant accident.

Towards the end of March, 1805, they prepared to continue their journey, taking different and separate routes, to pass with more expedition and facility through the other towns of the Viceroyship, situated on the road to Popayan, Cuenea and Quito, and so on to Lima; and in the following August they arrived at Guayaquil. This expedition not only succeeded in propagating vaccination throughout countries adverse as well as friendly, but, in the dominions of the King of Spain, they assured the perpetuity of the blessing by the establishment of the central societies, and also by the discovery of Dr. Valmis of the existence of the cow-pox in the Valley of Atlixco, near the city of Puebla of the Angels, and in the neighborhood of the city of Valladolid de Meehoacan, where it was discovered by the Assistant, Dr. Antonio de Gutierrez, and in the district of Calabozo in the province of Carracas, where it was found by Dr. Carlos de Pozo, a physician established there.*

The voyage of M. Valmis, will thus remain forever memorable in the annals of history.

The Indies saw for the first time three vessels, which were formerly freighted only with the instruments of carnage and destruction, bearing about the germs of relief and consolation to distressed and suffering humanity.

The arrival of the armed frigates in which M. Valmis made the circuit of the Atlantic and Pacific Oceans, gave rise on several coasts to one of the most simple and affecting ceremonies. The bishops, military governors, and persons of greatest distinction repaired to the shore, where they took in their arms the children who were to carry the cow-pox to the indigenous Americans and the Malays of the Philippine Islands, and followed with public acclamations, they laid at the foot of the altar those precious preservative deposits, returning thanks to the Supreme Being for having been the witnesses of so happy an event. We must have some knowledge of the ravages occasioned by the small-pox in the torrid zone, and especially among a race of men whose physical constitution seems adverse to cutaneous eruptions, in order to feel all the importance of Dr. Edward Jenner's discovery. It appeared to be a much greater blessing for the equinoctial part of the New Continent than for the temperate climate of the Old.*

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*Supplement to the Madrid Gazette, October 14, 1806. Phila. Medical Museum; vol. 3; 1807; p. 237.

THE RELATIONS OF GREASE IN THE HORSES' HEELS TO COW-POX.

HORSE-POX.—The facts concerning the origin of the cow-pox were investigated by Edward Jenner before the publication of his "Inquiry." His nephew, George Jenner, in the year 1787, went into the stable with him to look at a horse with diseased heels. "There," said he, pointing to the horse's heels, "is the source of small-pox. I have much to say on that subject, which I hope in due time to give to the world."

Writing to a friend in 1794, Jenner observes:

> "Our friends at our last meeting treated my discovery of the origin of the cow-pox as chimerical. Further investigation has convinced me of the truth of my assertion beyond the possibility of a denial. Domestication of animals has certainly proved a prolific source of disease among men. But I must not anticipate; you shall have a paper."

Subsequently to this letter, and before the publication of his "Inquiry," in 1798, Jenner made many experiments in order to determine the connection between the grease and the cow-pox; but difficulties of a nature not easily overcome interfered with his success. On the fourteenth of May, 1796, he made his first experiment, which demonstrated the possibility of propagating the cow-pox from one human being to another. From this period till the spring of 1798, Dr. Jenner's researches were interrupted by the disappearance of the cow-pox from the dairies. It again showed itself, and he had an opportunity of repeating his inquiries. Before bringing out his *Inquiry on the Variolæ Vaccinæ*, he was desirous of proving by direct experiment the truth of his opinion as to the origin of cow-pox, which at that time rested only on circumstantial evidence. Being foiled in his hopes of seeing more of that disease in its usual form in the dairies, he made many efforts, in 1797, to generate it from the heel of the horse. In reference to these experiments he wrote on the second of August, 1797, to a friend in the following terms:

> "The simple experiment of applying the matter from the heel of the horse, in its proper state, to the nipples of the cows when they are in a proper state to be infected by it, is not so easily made as at first sight may be imagined. After waiting with impatience for months in my own neighborhood, without effect, I sent a messenger to Bristol in vain to procure the true virus. I even procured a young horse, kept him constantly in the stable, and fed him with beans in order to make his heels swell, but to no purpose. By the time the pamphlet goes to a second edition, I hope to be able to give some decisive experiments."

At the time of the publication of the "Inquiry," with regard to the opinion that the source of the infection of cow-pox "is a peculiar morbid matter arising from the heel of the horse," Jenner believed that, though it had not been completely proved by actual experiments made under his own eye, it nevertheless was supported by evidence sufficiently strong to establish it.

When the inquiry was presented he imagined that the matter excreted in the heel of the horse required to be modified by passing through the system of the cow, in order to afford it the peculiar protecting power which it evinced when it appeared in the shape of what is vulgarly called cow-pox on the hands of the milkers. In the infancy of the investigation this was a most natural conclusion; but subsequent trials found that the *equine* matter, which had *never* undergone any change from passing through the constitution of the cow, exhibits all the characters of, and affords all the security which can be obtained from vaccine matter strictly so called.

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*Political Essay on the Kingdom of New Spain, by Alexander De Humboldt; London. 1811; vol. 2, pp. 111–118.

The following remarks of Dr. Jenner will illustrate this statement:

> "The skin of the horse is subject to an eruptive disease of a vesicular character, which vesicle contains a limpid fluid, showing itself most commonly in the heels. The legs first become oedematous, and then fissures are observed. The skin contiguous to these fissures, when accutely examined, is seen studded with small vesicles surrounded by an areola. These vesicles contain the specific fluid."
>
> "It is the ill management of the horse in the stable that occasions the malady to appear more frequently in the heel than in other parts. I have detected it connected with a sore on the heels of the horse, and on the thigh of a colt."

It has been established by unquestionable evidence that matter from the horse *does* produce a pustule similar in appearance to the vaccine; and likewise possessing the same protective power; and *that*, without having passed through the constitution of the cow. This fact, though it tends to prove the close relationship, if not the absolute identity of the diseases, does not prove that they both originated in the horse; but it strongly confirms the views of the simultaneous origin of the affections in question.

It seems certain that there are, at least, *four* animals, namely, the horse, the sheep and the goat, which are affected with a disorder communicable to man; and capable of securing him from what appears to be a malignant form of the disease. It has, moreover, been proved by direct experiment, that other animals are capable of receiving the vaccine disease by inoculation; and that matter taken from pustules so produced affords the genuine cow-pox in man. These animals on which these experiments have been tried are the dog, the goat, the she-ass, and the sheep. The fact with regards to the dog was ascertained by Dr. Jenner; with respects to the other animals, the facts rest on the authority of Valentine, of Nancy, who made his experiments in 1801–2, in communicating the human small-pox to dogs, asses and swine; he asserted also, that it had been proved by experiments at the Royal Veterinary College at Berlin, that the cow likewise receives the small-pox by inoculation.[*]

It is perhaps to be regretted that Jenner employed the word *grease*, instead of the *Variolæ Equinæ.* The *grease* has no necessary connection with the horse-pox *(Variolæ Equinæ)*, though the disorders frequently co-exist. This circumstance at first misled Dr. Jenner, and caused much misapprehension ahd confusion. The mistake in considering the disease, vulgarly called the *grease*, as the source of the cow-pox was subsequently corrected by Dr. Jenner himself; and he recognized the fact that the horse, as well as the cow, is liable to an eruptive disease of a variolous character, and that this disease of the horse, when communicated to man, is capable of affording protection against small-pox, even though it had never passed through the cow. For the most part, however, the equine affection was seldom recognized in the dairies, except in connection with a similar disease in the cow.

According to Dr. John Baron[†], the last observation of Dr. Jenner on the Variolæ Equinæ was in 1817. Dr. Baron copies the following memorandum from a manuscript written by Dr. Jenner on the first of April, 1817:

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[*] Medical and Physical Journal, September, 1802, p. 271.

[†] The Life of Edward Jenner, M. D., F. R. S., etc. London, 1838. Vol. 2, p. 226.

"Rise and progress of the equine matter from the farm of Allen of Wansell—From a horse to Allen; from Allen to two or three of the milch cows; from the cows to James Cole, a young man who milked at the farm; from James Cole to John Powell, by inoculation from a vesicle on the hand of Cole; and to Anne Powell, an infant; from Powell to Samuel Rudder; from Rudder to Sophia Orpin and to Henry Martin; from Henry Martin to Elizabeth Martin. All this went on with perfect regularity for eight months, when it became intermixed with other matter, so that no journal was kept afterwards. Proof was obtained of the patients being duly protected."

Another entry on the seventeenth of May runs thus: Took matter from Jane King (equine direct), for the National Vaccine Establishment. The pustule beautifully correct."

The matter from this source is said to have been extensively diffused in England and Scotland. Some years before 1817, Mr. Melon, of Litchfield, had found the equine virus in his neighborhood, and sent a portion of it to Dr. Jenner.

In 1818, Dr. John Baron sent Dr. Jenner some equine matter, which he obtained from the hands of a boy who had been infected directly from the horse. In this case the disease assumed a pustular form, and extended over both arms.

Dr. Jenner thus acknowledges the reception of this matter:

"April 25, 1818.

"Yesterday H. Sharpneil brought me the equine virus and your drawing, which conveys so good an idea of the disease, that no one who has seen it can doubt that the vesicles contain the true and genuine primative fluid. I have inserted some of it into a child's arm; but I shall be vexed if you and some ot your young men at the Infirmary have not done the same with the fluid fresh from the hand. * * *

"With best affections, yours, my dear doctor, very truly,

"EDWARD JENNER."

We have thus given the facts which referred to Dr. Jenner's experiments, and conclusions as to the relations of cow-pox to the grease and horse-pox; it should be noted that valuable observations were made by others upon this subject at an early date in the history of vaccination.

As early as 1800, Mr. Tanner, a veterinary surgeon at Rockhampton, raised a perfect vaccine vesicle on the teat of a cow, by first removing a scab from the surface of an accidental sore, and then rubbing over the sore the limped matter taken from the heels of a horse afflicted with what he regarded as the grease. Lymph taken from the vesicle thus raised was successfully transferred to the human subject, and a stock of vaccine thus obtained, some of which was sent to Jenner, and through him to the Small-pox Hospital. (*Ring's Treatise on the Cow-pox, p.* 336.)

Mr. Lupton, of Thame, in Oxfordshire, in 1800, correctly pointed out that the disease of the horse, which was analogous to cow-pox, and was communicable to the cow, was *not* "the *grease*," nor any form of grease, but a disease, regarded by the farmers of the neighborhood, as widely different from it, and to which they gave the name of the "scratchy heel," *Medical and Physical Journal, vol.* 4, *November,* 1800.)

In 1801, Loy, after many unsuccessful attempts, succeeded in infecting four cows, by inoculation with lymph from a "*greasey*" horse which with considerable indisposition had a generalized eruption.

Loy observed that the horses "that did not communicate the disease had a local affection only."

He was led by his experiments to distinguished two forms of grease, the acute and the chronic, the former of which alone he regarded as capable of imparting the cow-pox to the cow or to man, and then only when the matter was taken at the proper period of the vesicle. (*Loy, Experiments on the Origin of the Cow-pox, vol.* 8, *Whitley,* 1801.)

In 1803, Dr. La Font, a French physician at Salonica, was successful in producing the perfect vaccine vesicle in two young children with lymph, taken direct from a horse suffering from a disease which was known to the Macedonian farmers as "*grease*," but which they distinguished from ordinary *grease* by the epithet, "the variolous." The preservation of this fact was due to the great and zealous advocate of vaccination, Dr. De Carro.

DR. DE CARRO TO DR. JENNER.

VIENNA, June 21, 1803.

My Dear Sir—My friend, Dr. Marcet, wrote to me lately that the account I have sent you of Dr. Sacco's experiments have afforded you great satisfaction. The motive which induces me to write to you to-day is another confirmation of your theory, which has taken place in a country where you scarcely expect it from, the more so that it is accompanied with veterinary observations which appear to me very nice and curious.

Monsieur La Font, a French physician established at Salonica, in Macedonia, has been one of the most active vaccinators I know on the Continent; his last letter, of the third of June, mentions that he has since last autumn vaccinated 1130 persons. He first heard of your discovery on the occasion of Lord Elgin traveling in Greece with Dr. Scott, during which journey his lordship and the doctor took a particular care of propagating vaccination. The English Consul at Salonica went to Athens to meet Lord Elgin; there he saw a large number of young Athenians with vaccine pustules. Not a word had yet been heard at Salonica of your discovery, and he desired Dr. Scott to give him vaccine matter to put into the hands of Dr. La Font, and Lady Elgin was so kind as to give to the Consul a copy of my work for the instruction of his physician. The first Athenian matter did not succeed, but seeing its failure Dr. La Font applied directly to me, and my ivory lancets produced their effect at the first trial. Since that time I have been in regular correspondence with that physician, who appears to me to be possessed of much learning, prudence and activity.

Some time afterwards I sent him a translation of Dr. Loy's experiments, and desired him to make as many veterinary observations and experiments as he could. He has some reasons to suppose that the cow-pox reigns in that country, according to the reports of several Albanian peasants. As to the *grease* (which he calls javart), he says that the farmers at Salonica know it well. Dr. La Fout began his experiments with the kind of grease which the Macedonian farriers call *variolous*. He found a horse which had been attacked with feverish symptoms, that ceased as soon as the eruption appeared. The fore legs were much swelled; the left had four ulcers, one upon the heel, a second some inches higher, a third on the articulation, a fourth near the breast. The eruption on the legs was, he says, very like the small-pox, but none was to be seen on the other parts of the body. He took matter from the upper ulcer which was of twelve days standing.

The matter was limpid, but a ltttle yellowish and filamentous (three only); first, a cow was submitted to this inoculation, but without success; secondly, a girl twelve years old, without effect; but this girl had been vaccinated some months before without success, and was suspected to have had the small-pox; thirdly, two boys, one six, the other five years old, were inoculated with the same *equine* matter, and in both a pustule appeared, which followed the regular course of a vaccine pustule. The color was less white and more purple than usual. These two children had a pretty strong fever, for which some cooling medicines were administered. Those inoculated with matter from them underwent the disease in the usual mild way.

These particulars, I hope, will silence all those who still doubt of the method of your doctrine. These observations enhance the merits of your discovery. The *means* of making it were everywhere, yet nobody before you had the least idea of that singular connection between the grease, the cow-pox and the small-pox." (*Life of Edward Jenner by John Baron; vol.* 1, *p.* 431.)

Coleman, whose early attempts had failed, at a subsequent period succeeded in infecting a cow with matter taken direct from the heels of a horse, and in propagating vaccine from the vesicles thus induced.

Direct inoculalions were made by Viborg and by Kahlert on cows, and by Steinbeck, both on cows and children; and Sacco and several others succeeded in producing on human subjects perfect vaccine vesicles with lymph taken from sores (vesicles) on the hands of individuals, which sores they were quite satisfied had been derived from the horse.

In France, from the general negative results of repeated inoculations from horses' heels, doubts of the existence of an equine-pox seemed to have been largely entertained up to a very recent period; and Bosquet, re-viewing, in 1848, the whole of the experiments and observations up to that time, declared himself unsatisfied as to whether cow-pox had ever been derived from the horse or not. *(Nouveau Traité de la Vaccine, p. 436.)*

But within the last twenty-three years, the doubts of this connection of variolæ vaccinæ with variolæ equinæ, have been set at rest amongst the French physicians.

Two outbreaks of the disease among horses—one near Toulouse in 1860, and one at Alfort, in 1863—gave rise to inoculations, the results of which were acknowledged to be entirely unequivocal. These outbreaks were carefully observed and the phenomena of horse-pox well described.

M. Bresley, in 1863, induced the horse pox, by inoculation in the horse and other animals—the equine lymph being transferred from horse to horse.

Dr. Edward C. Seaton has given the following observations upon the horse-pox in his valuable "Handbook of Vaccination," which we have classified and condensed:

ARTIFICIAL PRODUCTION OF HORSE-POX BY INOCULATION.

The horse-pox has been designedly induced in the horse and other animals of the horse tribe by inoculation; *(a)* with equine lymph directly transferred from horse to horse; this was done on numerous occasions, and with great success, in 1863, by M. Bouley (Bulletin de l'Académie, tome 29, p. 236) *(b)* with equine lymph that had been passed successfully through a cow, producing in that animal all of the phenomenon of the genuine inoculated cow-pox; this was done both in 1860 at Toulouse by M. Lafosse (Rapport de l'Académie Impériale de Médecine sur les Vaccinations pendant l'Année, 1861), and in 1863 at Alfort by M. Bonley, and at the Jardin d'Acclimatisation at Paris (Bulletin de l'Académie, tome 29, pp. 131, 133 and 199); *(c)* with lymph, supposed to be unhumanized cow-lymph, not primary, but the product of a series of transmissions of primary lymph through animals of the ox tribe; this was done by M. Chauveau and his colleagues (Vaccine et Variolæ, etc., of Cit,); and *(d)* with ordinary human ized vaccine lymph; an experiment thus made, in 1862, by MM. Rayer and De Paul, at Alfort, resulted in the production of eight well-characterized vesicles, perfectly circular, with central depression and induration of the whole surrounding thickness of the dermis.

In the horse-pox induced by the ordinary process of inoculation, eruption is limited, with rare, if any, exceptions, to the points of inoculation. The local phenomenon are less active than in the natural disease, but the course of the disease is essentially the same.

ARTIFICIAL PRODUCTION OF HORSE-POX BY INJECTION OF LYMPH.

A variety of inoculation, viz., that of *injecting* the liquid vaccine lymph into the blood vessels or lymphatics of horses has been attempted by M. Chauveau, with the design of producing, if possible, by this method, the more extended or generalized eruption, which in this tribe of animals frequently attends the natural, or, as it is called, spontaneous disease.

M. Chauveau inoculated from old horses by injecting some vaccine lymph into a blood vessel, and four more by injecting into a lymphatic vessel, just before its entrance into a ganglion. The first series of experiments failed; but of the animals in the second series (those inoculated through the lymphatics) the inoculation succeeded in three out of the four, producing a fine eruption of vaccine, which had all the characters of the spontaneous horse pox. One, a horse, had a full eruption, commencing at the end of eleven days, and completely developed in three or four days more, on the nostrils and lips, as well as on the hind heels; the second, a mare, infected from the preceding, had isolated vesicles disseminated over the body, except the neck and posteriors, but chiefly in the mammary region and on the lips, the eruption commencing on the eighth day, and continuing to appear up to the fourteenth; and the third, a man, had, on the twelfth day, an eruption chiefly on the genital organs and the inner surface of the thighs. Seed virus, taken from the eruption on *each* of these animals, produced, it is said, regular vaccine both on the cow and on children. Subsequently M. Chauveau succeeded in inoculating a young colt by two injections of vaccine lymph, at intervals of two days, direct into the sanguinenous system through the jugular vein; vesicles beginning to appear, principally in the naso-labial region, in twelve days, and continuing to appear for four days more, the lymph of which was found to produce regular vaccine both on a child and on animals of the ox tribe.

Following out still further the same idea, M. Chauveau, by injecting vaccine into a pouch formed in the subcutaneous cellular tissue on the left side of the neck of a colt, but with great care that the lymph should not touch the wounded skin, obtained no local vesicle, but an eruption, commencing on the tenth day, of a few vesicles on the naso-labial region. From these results, in connection with the fact that nearly thirty successful inoculations of horses with the vaccine lymph in the ordinary way, no general eruption followed, M. Chauveau concludes that one essential condition of a *generalized eruption* to be that the virus should not pass through the membrane which is the anatomical seat of the vaccine eruption.

M. Le Blanc, however, states that he has seen *general* eruption to occur in a case in which inoculation had been done in the ordinary way, and that he proved the vaccinal character of the vesicles secondarily developed by equinating successfully from them, both horses and ruminants. (Chauveau, Des Conditions qui président au Développement de la Vaccine dite Primitive; Bulletin de l'Acad. Imp. de Med.; tome 31; also, Comptes Rendus de l'Acad. des Sciences, tome 62, p. 1118, and tome 63, p. 573.)—*A Hand-Book of Vaccination, by Edward C. Seaton, M. D., Medical Inspector of the Privy Council, pp.* 29-33.

CHARACTER AND COURSE OF HORSE POX.

It is evident from the preceding facts, that the HORSE, like the COW, is subject to a specific eruptive fever, resulting in the development of a pock, the material of which has the same property as the fluid of cow-pox, protecting the human system, when inoculated with it, from small-pox. This pock has the outward appearance and the anatomical structure which distinguish the vesicles of cow-pox. The chief point in which the diseases as seen in the horse, differ from that in the cow are, (1) the locality of the eruption—which is chiefly on the heels, and on the naso-labial mucous membrane; (2) the tendency of the eruption in some cases to become generalized over the body; and (3) its appearance in the male as well as in the female, horses being subject to it as well as mares.

The disease differs so little in its course from the cow-pox in the cow, that very minute description is not necessary. The chief distinction is as to the part of the body affected, which in the horse is principally the hind legs; the eruption being generally more copious there than anywhere else, and seldom extending beyond the hocks, except as the result of auto-inoculation. It is, no doubt, from its great exposure to this kind of inoculation that, after the heels, the naso-labial mucous membrane is the chief seat of eruption. In some cases the vesicles seen in this membrane may be primary; and there are said to have been cases in which this membrane was the sole seat of the disease. Occassionally, especially in certain epizootics, the eruption has been seen extending over the body, in greater or less abundance, from the heels to the belly, and from the head to the tail. This general eruption, when it occurs, may come on in the course of the disease, and after the usual local symptoms have manifested themselves; or the generalization may be noticed from the very outset.

The course of the disease is this: There is a period of invasion, sometimes accompanied with fever, which, if it occur at all, is, in the great majority of instances, very trifling; then, on the posteriors and other parts about to develop the eruption, points are felt, or seen, which soon acquire prominence and take the form of pimples, becoming rapidly flattened and umbilicated at the centre. These, by the eighth or ninth day, are fully developed, mostly circular, and of the size of a big lentil, notably elevated above the skin, resisting pressure, and having a well-marked surrounding induration. They have absolutely the same structure as the vaccine or variolous vesicle, and yield, although generally in small quantity, a viscid, slightly yellowish lymph. By the ninth, tenth, or eleventh day many of them burst, exuding, often copiously, a viscid, serous, or sero-purulent fluid; incrustation going on progressively and forming scabs or crusts, which, from the fifteenth to the twenty-fifth day, detach themselves, leaving whitish superficial vesicles. Varieties are observed, as in cow-pox, some of the vesicles being smaller and later than others, some less markedly umbilicated, some not umbilicated at all. They are most developed on the parts that are naked or have little hair, or where the skin is fine. If the hair be long and close, they are smaller and less regular, and attentive observation is often necessary to make out their existence; little pencils of hair will be seen standing up here and there, and if the finger be lightly moved over these spots, slight indurations will be felt, corresponding to pimples or vesicles, which may be brought to light by cutting the hair away. The horse-pox, like the cow-pox, is communicated from animal to animal by casual inoculations, immediate or mediate, and these inoculations are the main cause of the spread of the disease.

Horse-pox should be distinguished from *grease* on the one hand and Aphtha epizotica on the other.—*A Hand-Book of Vaccination, by Edward C. Seaton, M. D., Medical Inspector of the Privy Council, pp.* 27-29.

GENERAL DESCRIPTION OF COW-POX—OBSERVATIONS ON COW-POX BY ROBERT CEELY—ILLUSTRATION OF THE APPEARANCE OF THE HABITUAL COW-POX.

The cow-pox was thoroughly investigated by Edward Jenner, and he is also said to have exhibited drawings of the appearance of the disease in the cow.

The natural history of vaccinia in the cow has been studied more or less by various other observers, but by none so accurately or so comprehensively as by Robert Ceely, of Aylesbury, who, in 1839, showed in a satisfactory manner that by operating upon the mucous surfaces, instead of the more insensible corion, the cow can be made with facility to receive the variolous poison, which the constitution of that animal converts into vaccine. These important experiments were instituted under the auspices and supervision of the Provincial Medical and Surgical Association, in whose transactions (vols. 8 and 9) they are detailed at great length.

To facilitate the labors of the medical profession with reference to the recognition and propagation of the cow-pox, we have reproduced the accompanying plate of the vaccine disease, as it appears in the cow, from the illustrations of this affection by Mr. Ceely, of Aylesbury, England.

The plate illustrates the appearance of the *casual* cow-pox in the teats and udder of a black and white milch cow. *Plate* 19, *Figure* 80.

The disease is at its acme; and the skin being fair a slight areola is visible around some of the vesicles, many of which have a bluish central tint. It exhibits papular vesicles with central crusts, unacuminated and acuminated vesicles; imperfectly developed and also broken vesicles, both solitary and interfluent. The vesicles on the extremities of the teats are nearly of the color of the skin on which they are placed, a circumstance of itself sufficient to distinguish them from spurious or sub-epidemic vesicles.

GENERAL DESCRIPTION OF COW-POX—COURSE OF LOCAL PHENOMENA—DURATION OF THE VARIOUS STAGES OF COW-POX—CONSTITUTIONAL SYMPTOMS—SPURIOUS COW POX—DIAGNOSIS OF TRUE COW-POX.

Cow-pox is a specific eruptive disease, of the vesicular order, the eruption not being general over the body, but limited, to the udder and teats of the cow, the only exceptions being the results of accidental or casual inoculation. Cow-pox is met with from time to time, in various countries, either sporadically or as an epizootic, attacking particularly milch cows; young cows and milch heifers appearing to be more subject to it than older cows. In its earlier stages it is attended with so little general or obvious local disturbance that, in the animals first attacked in a dairy, these stages seldom come under skilled observation; and, as the fluid of the vesicles is very infective, and the disease is thus readily conveyed from animal to animal by the milkers, it is difficult to distinguish, in animals subsequently attacked, between those exhibiting the natural disease and those who have been infected casually by inoculation. There is first a period of incubation; but, from the extreme slightness of the earliest symptoms, it is very difficult to say how soon after infection has been received these may manifest themselves. In the *natural* disease the incubative period is probably three or four days, though in some cases it may be prolonged to from five to eight days. The earliest symptoms noted are heat, swelling and tenderness of the udder, soon followed by irregularity of surface and development of hard papules, about the size of a vetch or pea, especially on that part of the udder which adjoins the basis of the teats, and on the basis of the teats themselves. There is not generally at this stage, any loss of appetite, manifestation of fever, or other sign of constitutional disturbance. In the *casual* disease, or that which arises from infection by the unintentional inoculation of the milkers, it is very rare for any indications of contagion to manifest themselves till the sixth or seventh, sometimes they do not appear till the eighth or ninth day after undoubted exposure; but in thin-skinned animals with cracks or chaps in the teats, small red tender papules may often be found by vigilant observation as early as the fifth day. The papules increase in size as the disease goes on, and in three or four days from their first appearance, many of them will be found to have acquired a distinct vesicular character, with more or less central depression. The first change from papule to vesicle is indicated by the appearance of a dull or dusty yellowish point at the apex of the pimple, the circumference then increases in substance and extent, and the centre becomes wider and deeper, till at last the flattened vesicle with depressed centre is formed. As with the papules, so with the vesicles, there is gradual increase of size, until in three or four days more their full development is attained, the number, size, shape and color of the vesicles, differ much in different animals, as well as in different parts of the same animal.

There may be only one or two of them, but much more frequently there are ten, twenty or more; they are more common on the base, neck and body of the teats. The amount of eruption, and consequently the severity of the disease, depends greatly on the state of the teats and udder. With a short, compact, hairy udder, and thick, smooth, terse, unchapped, or scarcely cracked teats, the affection is often very mild, and sometimes there is only a single vesicle. An animal with a voluminous, flabby, cracked, pendulous udder, and loose, long teats, the skin of which is thin, fissured, rough and unequal, scarcely ever escapes a copious eruption. The size of the vesicles varies from that of a large pin head to that of a sixpence, or bigger, but is most ordinarily that of a vetch, pea, or horse-bean; in general, the more numerous the vesicles are, the smaller they are. Their shape is determined chiefly by their position. Around the base or neck of the teats they are almost invariably circular; on the body of the teats, generally oval, but oval vesicles may be seen also on the udder; and the vesicles on the teats are often interfluent. The color of the vesicles varies according to the period of their progress, and according to the color and texture of the animal's skin; but they have always a metallic-glistening aspect. By the time that the vesicle is completely formed, it is frequently seven or eight lines wide; but a solid, uniform, terse, and shining margin, a glistening white, pinky, or silvery hue, and a bluish or slate-colored centre; it contains a clear, viscid lymph, which, however, is even at this period generally in small quantity and often difficult to obtain; and around its base there is a narrow, pale-rose, or light-damask areola, not more than a line or two wide, and sometimes scarcely so much, though subsequently extending with circumscribed induration of the adjacent skin and subjacent connective tissue. The color of the areola, like that of the vesicles, is greatly influenced by the hue and texture of the skin, and in some skins—as in dark, thick ones—the areola is scarcely to be seen, or is entirely absent; but the induration is always palpable. Between the tenth and eleventh days the disease has generally reached its acme; the areola has extended, though seldom to more than a width of from four to five lines, and there is deep induration of the underlying integument. The vesicles, such as have not been broken, are at their fullest development; lymph, which two days before was hard to get from them, is now so copious that it raises the cuticle, destroying the central depression and forming a globular or conoidal vesicle, or it bursts the cuticle and flows freely out; it has already acquired, or soon acquires, a pale, straw-colored, or light-amber hue, and speedily becomes mere scum, turbid and opaque. While this is taking place in some vesicles, in others the process of incrustation will already have begun at the centre, and in others it may have even extended to the circumference. On and after the twelfth day nearly all is passive; the in-incrustation process continues steadily to advance, and by the thirteenth or fourteenth day the crusts have usually acquired their greatest magnitude, are of a brownish-black color, adhering more or less tenaciously to the epidermis or skin beneath, the marginal induration and intumescence at the same time subsiding. The crusts after this go on drying and shrinking, and they fall off usually from the twentieth to the twenty-third day, by which time the induration has nearly, but seldom wholly, disappeared. The cicatrices left after the falling of the crusts are shallow, *smooth*, oval or circular, and of pale-rose, white or whitish color, according to the contrast of the surrounding pigment. The vesicles on the teats are attended generally with less areola and less induration of circumference than those on the udders, but in other respects, in so far as they are undisturbed, and out of the way of the milkers, they exhibit exactly the same phenomenon and undergo precisely similar changes.

Such is the course of the *undisturbed* eruption, but from the tractions of the milkers it seldom happens that the vesicles, where they are most numerous, as on the base, neck and bodies of the teats, escape disturbance. By the eighth or ninth day, when the uninjured vesicles are the most perfect, injured ones will be found exuding lymph from their centres, the cuticle being loose or partially detached. Raw surfaces, and brown and black crusts will be intermingled, and here and there will be seen a conoidal vesicle, often with slightly depressed apex, distended with pellucid lymph. Two or three days later the appearance on the teats will exhibit crusts, large, black and solid, often more than an inch or two in length, some firmly adherent to a raw and elevated base, others partially detached from a raw, red and bleeding surface; many florid red, ulcerated surfaces secreting pus and exuding blood; the teats excessively tender, hot and swollen, not unfrequently one or more forming a tumid mass of black crusts and naked red sores, the discharge from which imparts to the finger an odor very closely resembling that of the last stage of small-pox. In some animals this state will continue for a week or two, but in others the process of healing will go regularly on, crusts being continually formed and renewed, till at last they fall off and leave cicatrices generally regular, smooth, circular or oval, but occasionally deep and irregular.

With reference to the *duration of the various stages of cow-pox*, it appears that the normal course of the disease occupies from twenty to twenty-three days, which may be divided into four stages, namely:

(a) About four days of early symptoms, during which papulation takes place.

(b) Six or seven days to the full development and perfect maturation of the vesicle.

(c) Five or six of decline of the vesicle and formation of the crusts.

(d) Five or six more from the completion of incrustation to the spontaneous separation of the crusts.

Stages *(a)* and *(b)* are often materially abridged in the natural disease, while in the casual disease *(a)* is sometimes prolonged, *(b)* being proportionately abridged or *(a)* is prolonged, *(b)* and all subsequent stages occupying the normal duration. These variations, however, in the early stages of the disease are often more supposed than real, the earliest symptoms being so extremely slight in many cases that they are overlooked. Both in the natural and casual cow-pox *(c)* is sometimes prolonged, often abridged. The whole of the cow-pox eruption is not by any means always simultaneously developed. Papules, depressed vesicles, acuminated or globular vesicles, and vesicles more or less desiccated, ranging in size from a pin's head to a diameter of eight or ten lines, may be seen on the same subject at the same time; but all, whatever their date of appearance, terminating together. No doubt these apparent anomalies are due either to self-vaccination of the cow from pressure, as in the act of lying down, or still more frequently to the manipulation of the milker.

Structure of the Cow-pox Vesicle.—If we examine the anatomical structure of the cow-pox vesicle, when completely formed, we find it consist of a number of cells, which appear to be arranged in two concentric rows, and are separated from each other by whitish radiating partitions united at their converging extremeties by a central membraneous band. In these cells is secreted and contained a clear viscid lymph. The dusky central spot, which marked the first change of the pimple into the vesicle, and which has now become darker and more distinct, seems to be caused by a greater or less degree of separation of the epidemics stretched over a crypt-like recess, which contains a small quantity of semi-concrete lymyh-like matter and occassionally a turbid opaque fluid. This cellular conformation of the vesicle is essential and diagnostic. It is by the bursting and breaking up of the cells and their connecting band, as the lymph becomes more abundant and less viscid, and by separation of the epidermis from its attachment to the subjacent adventitious membrane, that the vesicle in its further progress loses its distinctive central depression, and acquires the acuminate or convidal form, which has been described.

Constitutional Symptoms.—The local symptoms of cow-pox in the cow are seldom accompanied by any material constitutional disturbance; in the great majority of animals, feeding and grazing go on as usual. The secretion of milk is sometimes diminished; and, in most instances, the amount artificially obtained is greatly lessened from the trouble and difficulty of milking. In some cases the cow exhibits in the course of vaccinia a peculiar vesicular eruption very like vesicular varicella. It occurs generally about the ninth or tenth day, commencing with erythemato-papular elevations, which in twenty-four hours have become vesicles full of pellucid serous fluid. Next day this fluid is straw-colored, and it becomes speedily turbid, the cuticle collapses or bursts, turns yellowish-brown, and before the fifth day from their origin, the vesicles desiccate with brown or black thin flimsy crusts, which soon fall off.

Spurious Pocks.—The cow is liable to other diseases, which more or less resemble cow-pox, and from which it is important to distinguish it—a distinction all the more necessary that some of these diseases may, and in fact not uncommonly do, either co-exist with it, or immediately precede or follow it. Besides certain cutaneous, sub-cutaneous and follicular inflammations and suppurations on the udder and teats, which are liable to affect occasionally the hands of the milkers, warty growths and even warty vesicles, and eczema, or other superficial vesicular eruptions, three kinds of spurious cow-pox have been described by Ceely.

The Yellow Pock, a pustular eruption, resembling ecthyma on the teats and udders, succeeded by thin dirty-brown, or black irregular crusts.

The Bluish or Black Pock.—Bluish or black or livid vesications on the teats and udders, followed by thin dirty-brown or black irregular crusts, and some degree of impetigo on the interstics, near the base of the teats.

The White Pock.—A highly contagious disease among milch cows and to the milkers, quickly causing vesications and deep ulcerations, often or always confounded by them with the true vaccine, and certainly not readily distinguishable in all its stages by better informed persons than milkers.

Diagnosis of True Cow-pox.—Although broad and palpable grounds of distinction may be found between *vaccinia* and *white*-pock, in the character of the genuine vaccine eruption, its cellular structure, its hard and knotty feel, its glistening aspect, its tardy and progressive changes to the vesicular form, its central depression and its late acumination, the necessity for caution and accuracy of diagnosis must be borne in mind. Edward Jenner pointed out that milkers were very liable to contract infection from spurious pocks, and to acquire in consequence false and delusive ideas as to their having immunity from small-pox; and Ceely states that he has in several instances known milkers who undoubtedly had made this mistake suffer afterwards from small-pox, while in other instances he has discovered the mistake he had made in time to save the subjects of it from small-pox, by performing successful vaccination in the ordinary way. The white or blister-pock in the human subject exhibits sometimes, in fact, an appearance exceedingly like that of real cow-pox, so that, as in the case with the two diseases in the cow, some care may be necessary to distinguish them. It is communicable by inoculation from one human subject to another, and may be communicated repeatedly to the same subject. Mr. Ceely successfully inoculated himself three or four times with the virus of white or blister-pock. Other diseases of the cow besides white-pox may be contracted by milkers and communicated from them to other human subjects. Mr. Ceely relates a case in which a whole family (a wife and five children) labored under a *pustular* disease of the character of ecthyma, from infection by the father, who had himself caught the disease from a cow, described as being in a terrible condition.—*Robert Ceely, Transactions Provincial Medical and Surgical Association, vol.* 8, *vol.* 10. *A Hand-Book of Vaccination, by Edward C. Seaton, M.D., Medical Inspector to the Privy Council; London; Macmillan & Co.,* 1868; *pp.* 1-11.

COW-POX—RELATIONS OF COW-POW TO NATURAL AND INOCULATED SMALL-POX.

COMPARATIVE VIEW OF THE NATURAL SMALL-POX, INOCULATED SMALL-POX AND COW-POX—MICROSCOPICAL CHARACTER OF THE COW-POX, (VACCINE) LYMPH, AND OF THE CONTAGIOUS MATTER FROM THE PUSTULES OF SMALL-POX—COMPARATIVE PHENOMENA OF INOCULATED SMALL-POX AND COW-POX—COMPARATIVE PHENOMENA AND RELATIONS OF VARIOLA AND VARIOLOID—DETAILED DESCRIPTION OF THE ILLUSTRATIONS OF COW-POX, VACCINE DISEASE, CONFLUENT SMALL-POX DISTINCT SMALL-POX AND VARIOLOID—DEVELOPMENT AND STRUCTURE OF THE SMALL-POX PUSTULES—CHANGES OF THE TEMPERATURE AND URINE IN VARIOLA (SMALL-POX) AND IN VARIOLOID (MODIFIED SMALL-POX).

COMPARATIVE VIEW OF THE NATURAL SMALL-POX, INOCULATED SMALL-POX AND COW-POX.

The relation of INOCULATED COW-POX (*Vaccina*), to the natural and inoculated small-pox, were formulated in terse and unequivocal terms, shortly after the discovery of Jenner had resulted in the foundation of the Royal Jennerian Society.

The views held and propagated by the advocates of vaccination, were condensed and forcibly expressed in the following *comparative view of the natural small-pox, inoculated small-pox and inoculated cow-pox*, drawn up by John Addington* and published by order of the Medical Council of the Royal Jennerian Society, for the extermination of the small-pox.

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*Medical Repository, etc., Second Hexaude, vol. 1, New York, 1804, p. 313.

A COMPARATIVE VIEW OF THE NATURAL SMALL-POX, INOCULATED SMALL-POX AND COW-POX.

NATURAL SMALL-POX·

HISTORY, GENERAL CHARACTER, MORTALITY.

For twelve centuries the disease has been known to continue its ravages, destroying in every year an *immense* proportion of the whole population of the world.

A contagious disease, in some instances mild, but for the most part violent, painful, loathsome and dangerous to life.

One in six who have the disease dies. At least half of mankind have it; consequently one in twelve of the human race perish by one disease. In London, 3000 annually; in the United Kingdom, 40,000

Circumstances, independent of contagion and mortality, viz: Danger, eruptions, confinement, loss of time, expense, requisite precautions, medical treatment, deformity and subsequent diseases.

1. One in three has the natural small-pox in a dangerous form.
2. It produces eruptions, numerous, painful and disgusting.
3. Occasions confinement.
4. Loss of time; and
5. Expense more or less considerable, affecting individuals, families, parishes, etc.
6. Renders precautions for the most part unavailing.
7. Medical treatment necessary both during treatment and afterwards.
8. Leaves pits, scars, seams, etc., disfiguring the skin, especially the face; and, is followed by *scrofula* in every form, diseases of the skin, glands, joints, etc., blindness, deafness, etc., etc.

INOCULATED SMALL POX.

A *contagious disease*, for most part mild, but in some instances *violent*, *painful*, *loathsome*, and *dangerous to life*.

One in three hundred inoculated dies. In London, probably *one in one hundred*.

The inoculation of the small-pox having been but partially adopted, has become the means of spreading the infection, and has thus increased its general mortality. In London this increase has been in the proportion of *seventeen* in every *thousand*.

1. One *in thirty or forty has had inoculated* small pox in a dangerous form.
2. It produces eruptions in greater or less numbers.
3. Occasions confinement.
4. Loss of time; and
5. Expense, sometimes considerable.
6. Requires preparation by diet and medicine; care to avoid certain seasons, as extremes of heat and cold; certain periods of life, as early infancy and old age; and certain states of constitution, as general ill-health, teething, pregnancy, etc., etc.
7. Renders *medical treatment* usually necessary.
8. Is liable to produce *deformities* whenever the disease proves severe; and to be
9. Followed by the diseases as above enumerated, but less frequently.

INOCULATED COW-POX.

Not contagious; and when properly conducted *uniformly mild*, *inoffensive*, *free* from *pain* or *danger*, and an infallible *preventive* of the *small-pox*.

NEVER FATAL.

During a long series of years the *cow-pox* accidently received, has been considered as *a preservative* against any future attack of the *small-pox*. Many persons in the dairy countries, who have had the former in their youths, have remained to old age unsusceptible of the latter.

1. The inoculated cow-pox is attended by no *danger*.
2. Produces a *pustule* in the *inoculated part only*.
3. Occassions neither *confinement*,
4. *Loss of time*, nor,
5. *Expense*;
6. Demands no other *precautions* than such as respect the *conduct* of the *inoculated*;
7. Requires no medicine;
8. Leaves no *deformity* nor *disfiguration*;
9. Excites no *subsequent diseases*.

NATURE OF THE VIRUS OR CONTAGIUM OF COW-POX AND SMALL-POX.

The virus of cow-pox is not known to be communcaible otherwise than by direct contact or inoculation.

In this respect, therefore, it differs from its congeners, the *contagia* of small-pox and variolæ ovium, both of which are believed to be readily communicable through the air. Considering the very close analogies which subsist between these three diseases, it has been held with reason that this contrast may be due not so much to any intrinsic difference between contagious particles by which they are respectively propagated, as to differences in the amount of virulent matter generated in the infected organism, and in the facilities afforded for the distribution of this matter through the surrounding medium. Inasmuch as not one of the three contagia is volatile, infection at a distance can only take place by the transfer of particles derived from the diseased individual to some absorbent surface in the healthy one. Such absorbent surfaces are to be found in the mucous membranes lining the air passages and the alimentary canal. That the virulent matter is capable of being absorbed from the intestinal surface, and causing all the phenomena of constitutional infection, has been experimentally proved in the case of ovine variola; and the result may reasonably be extended to the two allied disorders.

Experiments with reference to the introduction of small-pox virus into the system through the channel of the alimentary canal appear to have been made as early as 1792 (six years before Dr. Jenner published his Inquiry on the *Variolæ Vaccinæ)*, as will be seen from the following statement:

SMALL-POX COMMUNICATED TO MAN AND ANIMALS BY EATING THE SMALL-POX MATTER, IN 1792.

John Maisillæ gives the following facts, in the *Bulletin de la Societe Philomatique*, for October and November, 1792:

"A peasant of the County of Essex having a great many children carried off by the *natural* small-pox, was desirous of inoculating his two boys—one nine and the other twelve years old. Not being able to employ a surgeon, he collected the scabs of a child then sick of the disease, powdered them, and sprinkled the powder upon slices of bread and butter. The two sons eat them, and gave a bit to the *house dog*. They had a mild small-pox, and got well without any remarkable accident. The dog remained sick for two or three days, drinking a great deal and refusing to eat; on the fourth he had a very decided variolous eruption; on the ninth the pustules were full ripe and dried up, and fell off like those of the two children. An English author says he has observed the same epidemic in a flock of *sheep*, the greater part of which were affected, and communicated it to *two cows*, one of which died. The symptoms that manifested themselves in these animals, in the course of the disease, were in every respect the same as are observed in the human species."—*The Medical Repository, vol.* 1, *Third Edition; New York*, 1804 *; p.* 247.

When we consider the number of distinct foci, each yielding a large amount of infective matter, distributed over the skin of a man affected with small-pox, or of a sheep suffering from the severe form of ovine variola; when we recollect further, that similar infective foci exist elsewhere in the body, as in the mouth, fauces and throat of man, and in the lungs of the sheep, while secondary nodules full of virulent particles are often developed, in situations which enable their products to be discharged into the surrounding medium by respiration and by coughing; we cannot but be struck with the contrast between these two diseases and cow-pox as it occurs after inoculation in the human subject. The quantity of infective material generated in cow-pox, though very considerable in relation to the amount introduced, falls very far short of the common supply yielded by a single case of ovine or human variola; and what there is, is generated in a situation which absolutely precludes its distribution throughout the environment, at least during the period when the infection of the contagion is at its highest.

Since the difference between the communicability of vaccinia on the one hand and of small-pox on the other, admits of being thus easily explained; it appears that the difference is one of degree only, and that deductions from experiments performed with the contagia of cow-pox may be extended to variola.[*]

Cow-pox and small-pox, whether inoculated or arising in the natural way, are attended during the active stage of the development and increment of the specific contagion, by febrile pyrexia.

The recognized characteristics of fever, are those which relate either to the disintegration of the living substance of the body, or to the increase and diminished constancy of the bodily temperature; but it is essential to the correct definition of fever that it should comprehend particulars relating to its origin, progress and termination; in other words fever is not merely a state but a process. Fever has its beginning in the entrance into or action on the organism of some affecting or infecting cause. After this event follows the period of latency; and it is not until it is passed that the first indications within the affected organism begin to manifest themselves. The state of fever once established, it may vary in its course, in its duration, and in the local inflammation which accompany it; but in all cases it has its onset, accession, and declension, each of which is characterized by more or less distinctive phenomena.

Two hypothesis have been framed as to the nature of fever, however excited.

One is that fever originates in disorder of the nervous centres, that by means of the influence of the nervous system on the systemic functions, the liberation of heat at the surface of the body is controlled or restrained, so that by *retention* the temperature rises, and finally that the increased temperature so produced acts on the living substance of the body so as to disorder its nutrition.

The other is, that fever originates in the living tissues, that it is from first to last a disorder of protoplasm, and that all the systemic disturbances are secondary.

In both hypotheses it is tacitly admitted that fever is the product of a *natural fever-producing cause* contained in the blood or tissue juice, the morbific action of which in the organization is antecedent to all functional disturbances whatever.

The first hypothesis must be rejected, because, on the one hand, no disorder of the systemic functions, or of the nervous centres which preside over them, is capable of inducing a state which can be identified with febrile pyrexia; and on the other, that it is possible for such a state to originate and persist in the organism after the influence of the central nervous system has been withdrawn from the tissues by the severance of the spinal cord.

It appears to be more rational to adopt the hypothesis of the tissue origin of fever[†].

Dr. J. Burdon Sanderson (2) has shown by experimental investigation that whatever may be the nature of the poisonous agent, which produces septic fever and infective inflammations, it admits of complete removal by mechanical filtration. It is therefore material and particulate.

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[*] Dr. Baxter's Report on an Experimental Study of Certain Disinfectants. Reports of the Medical Officer of the Privy Council and Local Government Board, New Series, vol. 6; London, 1876, p. 216.

[†] Dr. J. Burdon Sanderson on the Process of Fever. Public Health Reports of the Medical Officer of the Privy Council and Local Government Board; New Series, vol. 1, London, 1875, pp. 9, 40-42, 47; vol. 2, 1876.

MICROSCOPICAL CHARACTERS OF VACCINE (COW-POX) LYMPH AND THE CONTAGIOUS MATTER FROM THE PUSTULES OF SMALL-POX.

There are a few contagious diseases in respect of which the presence in the contagious liquids of forms of vegetation differing from those met with either after death in the normal tissue or liquids of the body, or during life in the products of primary or secondary inflammations, has been established. These are small-pox, sheep-pox, splenic-fever and relapsing fever.

The first statements as to the existence of organisms in the lymph of cowpox was made by Dr. Keber,[*] of Dantzic, in 1868, who regarded them as the carriers, if not the generators, of the active virulent principle.

In 1869, Dr. Burdon Sanderson[†] began a series of most valuable ætiological researches in a new direction, and in his first paper on the pathology of contagion, published in 1870, he gave an account, accompanied by a wood cut of certain bodies to which he assigned the name of microzymes, the presence of which he found it was usually possible to demonstrate in vaccine liquid. Dr. Sanderson was not able, however, to assert that their presence was or was not essential to the infective activity of the virus.

In 1863, Dr. Lionel Beale described in a paper which appeared in the "Microscopical Journal," for April, 1864, the existence of transparent hyaline particles, of extreme minuteness, in vaccine lymph. These particles he regarded as masses of living matter, or germinal matter. In a subsequent research on the same subject, an account of which appeared in the Report of the Royal Commission on Cattle Plague, his previous results were confirmed. Both papers contain drawings of the particles. Since that time, vaccine lymph has been examined by many other skillful observers, all of whom agree that the liquid, notwithstanding its apparent limpidity, contains minute particles. In the papers referred to, Dr. Beale expressed his opinion that the contagious principle resided in the granules, but he did not offer any experimental proof of its being so.

At this point the investigation was taken up by Dr. Chauveau, of Lyons, who, without knowing of the observations of Dr. Lionel Beale, had also found that vaccine lymph contains particles. Using the large field at his disposal, as professor in the Government Veterinary School at Lyons, he has carried out a number of experiments as to the physical character of infective liquids in the communicable diseases of animals. His earliest researches were directed to the relation between cow-pox and small-pox, and are contained in well known reports on these diseases published at Lyons in 1865[‡].

Subsequently, M. Chauveau directed his attention to the question of the nature of the contagious process in general, taking as his basis an inquiry into the physical characters of vaccine.

Mature vaccine lymph contains in suspension two kinds of particles. In the first place, bodies are generally met with analogous to pus corpuscles. They do not differ from the corpuscles which occur in pus in an early stage of formation, as in the liquid of a blister when first becoming opalescent. But besides those particles vaccine contains particles far inferior to them in size, not exceeding indeed 1-20,000 of an inch in diameter.

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[*] Keber. Ueber die microscopischen Bestandtheile der Pocken—Lymphe. Virchows Archir, vol. 42, p. 112.
Reports on recent researches on the Pathology of tho Infective Processes, by J. Burdon Sanderson. Public Health Reports of the Medical Officer of the Privy Council and Local Government Board; New Series, vol. 3, London, 1874, pp. 11-48.

[†] Introductory Report, by Dr. Burdon Sanderson, on the intimate Pathology of Contagion. Public Health. Twelfth Report of the Medical Officer of the Privy Council, 1869; London, 1870, pp. 229-256.

[‡] Vaccine et Variola, étude experimentale sur la question de l'identité de ces deux affections, Paris, 1865.

Starting from these facts, M Chauveau proceeded to inquire by experiment, in which of those three elements of which vaccine consists (viz., the leucocytes, the minute particles, and the clear liquid in which they float) the activity of the vaccine resides.

By careful experiments M. Chauveau (1) has proved that the leucocytes contain nothing essential to the activity of vaccine lymph; and also that the fluid portion freed from the minute particles although containing all the soluble constituents of vaccine, is wanting in those upon which its activity depends.

The experiments of Chauveau were perfected and repeated by Dr. Burdon Sanderson in 1869, and their accuracy was confirmed and the result established that the infective property of vaccine lymph, resides in the minute particles; although the proposition was not announced by Dr. Sanderson and Chauveau. About the same time Professor Klebs, (2) described the minute particles of vaccine in his handbook of Pathology(3).

Two years afterwards, Professor Ferdinand Cohn, (4) of Breslau treated of this subject. His observations relate both to vaccine and variolous lymph, and led to the interesting discovery that the organisms (minute particles) discovered in vaccine lymph by Lionel Beale, Chauveau, Klebs and Burdon Sanderson, are also found in the variolous lymph, and present characters so entirely similar, that it is not possible to draw any distinction between them, either as regards form or development.

According to Professor Ferdinand Cohn, vaccine and variolous lymph is always to be found filled with spheroidal particles or corpuscles, which, although they exhibit molecular motion, have no motion of their own. They are extremely small, and in their reaction on light differ little from the serum in which they are suspended, on which account they are easily overlooked. It is difficult to determine the diameter of the spheroids micrometrically, but Professor Cohn estimates it about three-quarters of a micromillimeter. In addition to these, numerous larger and more refractive bodies are found in the lymph, as regards which it is difficult to say whether they are fat globules or result from further development of the others. It seems most probable that they are cells, each of which consists of a dark central part, surrounded by a membrane indicated by a clearer ring, an appearance often seen in stages of division. In perfectly fresh preparations most of the corpuscles are simple, others being joined together in a form resembling the figure 8. After the preparation has been kept, the number ot these double cells increases, and soon chains of four begin to be distinguishable.

These chains are usually curved or in zigzag; their attachment one to another is evidently very slight, as they can readily be displaced. After one or two hours, numerous necklaces present themselves, usually of eight joints, which are even more readily broken up than the others. In this displacement the groups are to be attributed; of these, some resemble sarcinæ, but it is to be observed that no true sarcinæ showing crucial division present themselves. Obviously the very rapid and uninterrupted multiplication of the spheroids takes place by a process of repeated transverse division, in which the septa are parallel, so that the resulting daughter cells are arranged in necklaces like the spores of a penicillium. In consequence of their very slight attachment to each other, it is only at the beginning that the original grouping, due to their mode of development, is

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1 Détermination experimentale des éléments qui constituent le principe actif de la serosité vaccinale virulente. Comptes Rendus, LXVIII. 1868, p. 289.

2 Twelfth report of the medical officer of the Privy Council, London, 1870, p. 233.

3 Klebs, Handbuch des Pathologie, vol. 1, p. 40.

4 Cohn, Organismen in des Pockenlymphe Virchows Archir, vol. 55, p. 229.

traceable. After a few hours' observation they are sure to be all aggregated into irregular colonies or clumps, each consisting of sixteen, thirty-two, or more, corpuscles. The multiplication of cells lasts for several days, the aggregations becoming larger and larger. In capillary glass tubes the multiplication of colonies sometimes lasts a long time, so that they acquire considerable size, and present themselves as flocculi. By the formation of mucous-like interstitial substance the corpuscles become intimately united with each other, the mass being converted into zoogloea. When this is the case, the size of the individual cells increases, their contents becoming more refractive, so as to resemble oil drops. As these agglomerations are apt to be encrusted with other bodies derived from the lymph, the characters which indicate their origin become indistinct. It often happens that the changes described are associated with the appearance of acicular crystals resembling raphides.

Some months before the appearance of the paper of Professor Cohn, containing the preceding facts with reference to the organisms of vaccine and variolous lymph, etc., Weigert,* of Breslau, published a short communication founded on the microscopical examination of the skin in patients who had died of small-pox, in which he stated that he had found the lymphatics plugged with a granular mass which exhibited all the characters of micrococci.

The fact that organisms of a particular form exist in the lymph of small-pox, taken in connection with the occurrence of similar organisms in the channels of absorption leading from the pustules, suggest the probability of their having to do with the morbid process.

During the small-pox of New Orleans of 1881, 1882 and 1883, I have repeated the observations of Kohn and obtained similar results with reference to the spheroidal particles or corpuscles of vaccine and variolous lymph.

COMPARATIVE PHENOMENA OF INOCULATED SMALL-POX AND COW-POX.

INOCULATED SMALL-POX.

Inoculation is performed by introducing into the arm, at the insertion of the deltoid, by means of a lancet, a minute portion of variolous matter. The thin lymph of a fifth day vesicle is to be preferred to the well-concocted purulent matter of the eighth day, but both are efficient. One incision only is to be made. A minute, orange-colored spot is perceptible by the aid of the microscope on the second day; on the third or fourth day, a sensation of pricking is experienced in the part. The punctured point is hard, and a minute vesicle, whose centre is depressed, may be observed surmounting an inflamed base. On the fifth day the vesicle is well developed and the areola commences. On the sixth day the patient feels stiffness in the axilla, with pain. The inoculated part has become a hard and inflamed phlegmon. The subjacent cellular membrane has become involved in the inflammatory action. On the evening of the seventh, or early on the eighth day, rigors, headache, a fit of syncope, vomiting, an offensive state of the breath, alternate heats and chills, langor, lassitude, or, in the child, an epileptic paroxysm, announce the setting in of fever. The constitution has been invaded by the operation of the contagium from the local disorder.

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*Weigert uhn Baltinen in der Pockenhuut; Contralblatt, 1871, p. 609.

On the appearance of febrile symptoms, the inflammation of the arm spreads rapidly. An areola of irregular shape is soon completed, which displays within it minute confluent vesicles.

On the tenth day the arm is hard, terse, shining and very red. The pustule discharges copiously, and ulceration has evidently penetrated the whole depth of the corion.

On the eighth day spots of variolous eruptions show themselves in various and often in the most distant parts of the body. In a very large proportion of cases, the eruption is distinct and moderate. Sometimes not more than two or three papules can be discovered, which, perhaps, shrivel and dry up without going through the regular process of maturation. At other times the eruption is full and semi-confluent, passing through all the stages of maturation, and scabbing, and cicatrization, with as much perfection as the casual disease can display. Between these extremes every possible variety may be observed. The truly confluent eruption with affection of the mucous membrane is very rare, and that implication of the fluids and solids and of the nervous system, which together constitute the extreme of variolous malignity is nearly, if not entirely, unknown.

Secondary fever of any great intensity is not common.*

INOCULATED COW-POX—VACCINATION.

The symptoms which cow-pox manifests in the human subject resemble very closely those observed in the cow.

If vaccine lymph on the point of a lancet be inserted by puncture on the arm of an individual who has not been before vaccinated, nor has suffered with the small-pox, no particular local effect is noticed for the first two days; but at the end of the second or by the third day, a slight papular elevation is perceptible, which by the fifth or sixth day, has become a distinct vesicle of a bluish-white color with a raised edge, and a peculiar central, up-like depression. By the eighth day (the day week from the insertion of the lymph) this vesicle has attained its highest perfection, is plump, round, and more decidedly pearl-colored; the elevation of its margin and the depression of its centre, are more marked. At this date or a few hours earlier a ring of inflammation termed the areola, begins to form about its base, and for the next two days continues to spread. It is circular and, when fully developed, has a diameter of from one to three inches, and is often attended with considerable hardness and swelling of the subjacent connective tissue. The establishment of this areola, is the anatomical evidence that the cow-pox has produced its specific effects on the constitution. Other proofs of the constitutional influence of the vaccination are, its course, generally manifested in restlessness, heat of skin, with derangement of the stomach and bowels, and with, in some cases, swelling of the axillary glands.

These general symptoms, though seldom altogether absent, are often exceedingly slight.

After the tenth day the areola begins to fade, the vesicle begins to dry in the centre, the lymph remaining in it becomes opaque and concretes, and by the fourteenth or fifteenth day a hard, brown scab is formed, which contracts, dries, blackens, and from the twentieth to the twenty-fifth days falls off, leaving a cicatrix commonly permanent, and which in character is circular, somewhat depressed, foveated or indented with minute pits, and sometimes radiated.

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*Lectures on the Eruptive Fever, by George Gregory, M. D., New York, 1851, pp. 108-110.

Occasionally certain constitutional symptoms beyond those already described are observed in young children of full habit, especially in hot weather, about the ninth or tenth day, when the areola is at its height, an eruption of roseola will sometimes take place, chiefly on the extremities; sometimes the eruption has a papular form (vaccine lichen), and sometimes it is vesicular. These eruptions are generally very transitory; their ordinary duration does not extend beyond a week, and they very seldom last beyond the falling of the scab.

When lymph is employed that is derived directly, or say recently, as either three or four removes from the cow, the course of the disease is generally retarded at various stages. Papulation is sometimes deferred till the seventh, eighth, ninth or even the tenth day, and the areola is not completed till from the eleventh to the fourteenth, or even the sixteenth day. The areola, when at its height, is more indurated than is observed in vaccination with ordinary humanized lymph, and is said to decline and revive, continuing to exhibit a brick-red or purplish hue while the hardness remains.* The papular and vesicular eruptions which occasionally attend vaccination with humanized lymph, at this stage of its course, are more frequently seen. The vesicles themselves are commonly more developed than those produced by ordinary lymph. Desication is generally prolonged, and the crust is often retained till the fourth or fifth week.

Such are the ordinary phenomena induced by primary vaccination, in the human subject. The course however, is sometimes modified; and may be simply retarded, simply accelerated, or altogether irregular and spurious.†

The anatomical changes in the skin after the first vaccination clearly resemble those of variola. While fever never occurs at the commencement of vaccinia, the stage of maturation is always accompanied by a secondary fever. In incomplete, modified vaccina, the inflammation of the skin sometimes causes insupportable itching. sometimes tense or burning pain

From humerous measurements of temperature, Dr. Felix Von Wiemeyer,‡ has satisfied himself that the patient has a fever which is not at all in proportion to the intensity and extent of the dermatitis. Where the local symptoms were very slight, Dr. Niemeyer has noticed a temperature of 104°. But from the less extent of the dermatitis, the fever never becomes so high as in variola; it can only prove dangerous to very weakly children, and only in rare cases. It is rare also for dangerous erysipelas or pseudo-erysipelatous inflammation of the arm to occur during the stage of maturation.

PHENOMENA AND RELATIONS OF VARIOLA AND VARIOLOID—PHENOMENA OF VARIOLA (SMALL-POX).

It is not necessary to the present inquiry, that a minute description should be given of the varieties of small-pox, such as the UNMODIFIED; *confluent* (pustules running together over the greater part of the body; *semi-confluent; distinct* or *discrete* (all the pustules separate); *Petechial Haemorrhagic* (blood effused into the vesicle or pustules, with a tendency to haemorrhage from the mucous surfaces); *malignant, variola nigra. black small-pox. variola purpura; variola corymbosa.*

It is important that such facts should be recorded as illustrate the difference between cow-pox and small-pox on the one hand. and varicella (chicken-pox) on the other; and *also to determine, whether the modified*

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*Ceely: Observations on the Variolæ Vaccinæ. Transactions of Prov. Med. and Sur. [illegible] Vol 8. p. 346.

†Vaccination by Edward Cator Seaton. M. D.

‡A Text book of Practical Medicine. New York, 1869. vol 2. p. 579.

small-pox (varioloid), in which the pustules are cut short in their development by vaccination or previous attacks of small-pox, presents decided differences in its thermometry and chemical pathology.

We have endeavored to present a comparative view of the appearances of the cow-pox in the human being and in the cow, and also of the discrete and confluent small-pox and of the modified small-pox (*varioloid*).

Plate 17, Figure 76, represents the variolæ vaccinæ. This drawing represents the hand of Sarah Nelmes, infected with the cow-pox from her master's cow, in May, 1796. Dr. Jenner states that the pustule was so expressive of the true cow-pox, as it commonly appears upon the hand, that he had given a representation of it in Plate 1, of his "*Inquiry into the Causes and Effects of the Variolæ Vaccinæ*," Case 16, p. 31.

Plate 18, *VARIOLÆ VACCINÆ.—Figure 77, arm of John Baker, vaccinated March 16, 1798 (Plate 2, case 18. Inquiry, Edward Jenner, p. 35); Figure 78, arm of William Pead (Plate 3, case 20, Inquiry, Edward Jenner, p. 38); Figure 79, arm of Hannah Excell, (Plate 4, case 21, Inquiry into Variolæ Vaccinæ, Edward Jenner, p. 39).

Plate 19. COW-POX.—The *casual cow-pox* on the teat and udder of a black and white milch cow, after Dr. Ceely, of Aylesbury.

Plate 20, SMALL-POX (VARIOLA).—Figure 81, confluent small-pox; Figure 82, confluent small-pox; Figures 83, 84 and 85, small-pox pustules (discrete small-pox).

Plate 21, VARIOLOID and VARIOLA.—Figure 86, varioloid (modified small-pox); Figure 87 and 88 small-pox eruption; Figure 89, varioloid eruption; Figure 90, varioloid eruption.

It is important that the cases furnishing the Figures in Plates 20 and 21, should be examined somewhat in detail.

Plate 20, figure 81: portrait delineation of the confluent small-pox eruption* as it appeared on the TENTH DAY after it broke out on the face and hand of a female patient, who was at the time of the disease in the small-pox ward of La Petié Hospital of Paris. She was twenty-five years of age, and had never been protected either by the cow-pox or the variolous disease.

She experienced all the common symptoms which generally attend this form of variola, and during the day on which the painting was executed she exhibited, in her features, the appearance of great anxiety and distress; the general swelling of the face, however, was not so great as often takes place in cases of the distinct variola, and the disease was one of moderate severity. Some of the pustules about the nose, mouth and chin had begun to dry up and look scaly.

After the TENTH DAY desiccation continued to progress, and on the FOURTEENTH DAY the eruption on the nose and the other parts of the face presented the appearance represented in figure 82, plate 20.†

From this date the disease pursued its usual course, and the patient, after five weeks of illness, was able to leave the ward, but her features were much deformed by the extensive ulceration caused by the eruption.

Figures 83, 84 and 85 represent the discrete and confluent small-pox eruption as it appeared at different periods on the face and hand of a girl aged fourteen. Figure 83, fifth day; figure 84, seventh day; figure 85, on the eleventh day of the eruption.‡

Plate 21, figure 86, represents a case of varioloid or modified variolous eruption of the distinct kind, as it appeared on the fourth day of its development. The female who was the subject of this eruption had been vaccinated when young, and the marks of the vaccination were visible on her arm. The scars were deep and smooth, and were supposed from their general appearance to be the results of a spurious disease. On the ninth of May, 1826, she experienced some unpleasant chills, which were accompanied with slight nausea. These were soon followed by flushes of heat, pains in the head, back and limbs, and by considerable, though moderate, fever. On the twelfth, and after three days of illness, a few pimples were discovered on her face and body. The pocks were in moderate number, and amounted, perhaps, to two or three hundred. They were more numerous on the face than on the trunk and extremities. The pimples were papular at first, were hard to the touch and rather painful on pressure, and before the termination of the second day the tops of them became vesicular. As they were converted into vesicles they increased in diameter and became more globular, but did not project far above the common surface. On the third day the pocks were all converted into vesicles, and were filled with a yellowish kind of serum. On the FOURTH DAY they had attained to the full size, and the eruption exhibited all the appearances represented in the portrait in plate 21, figure 86. The bases of the pocks were still surrounded by bright-red areola, and were hard and tubucular to the finger The fluid contents of the eruption had grown yellowish and more consistent, and the flattened surfaces of some of the pocks had become slightly discolored. From the fourth day the pocks decreased a little in diameter, but diminished proportionately in elevation, and in a few instances they united and ran together. The matter in them continued to grow thicker and more purulent in its character, and their tops, in consequence of the gradual coagulation or congretion of the virus, assumed by degrees a dry and discolored appearance; and on the *sixth* day the pocks had flattened considerably, and the inflamed areola surrounding them had diminished in redness and breadth. From the *seventh* day desiccation proceeded rapidly, and by the eighth the virus had concreted into a solid mass. In drying, the pocks were formed into reddish-brown crusts or scabs, and during this process they gradually became shrivelled and the scabs or crusts began to scale or crumble on the eighth or ninth day; and on the *tenth day* most of the scabs had separated and fallen off, and left brown-colored depressions in the skin. These discolored depressions remained for some time, and were distinguished by a tubucular hardness. They finally, however, disappeared, and left no traces of the existence of the malady. The patient, through the whole course of the disease, suffered but little, and was not, for a single day, confined to her bed. The febrile symptoms subsided on the breaking out of the eruption, and did not afterwards reappear. A swelling of the face and hands took place during maturation, but this went off as soon as desiccation commenced.*

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*The paintings from which plates 20 and 21, figures 81 to 90, were engraved, were made in the Hospitals of Paris during the years 1825 and 1826, a period at which the variolous disease prevailed epidemically in that city. They were executed by a French artist, under the immediate direction of Dr. John D. Fisher, of Boston, Massachusetts, and were all begun and finished at the bedside of the patients from whom they were taken. In making the drawings Dr. Fisher was careful to attend to a circumstance of some importance, in attempting an accurate and intelligible representation of the diseases intended to be illustrated by them; neither the severest nor the mildest cases were selected, but those of moderate severity, as it was thought that delineations of the maladies equally removed from the two extremes would be the best calculated to guide the inexperienced practitioner to a correct diagnosis. Dr. Fisher regarded the small-pox and the varioloid as one and the same disease, and that the chicken-pox is a *separate* and independent malady.

Description of the Distinct Confluent and Inoculated Small-Pox, Varioloid Disease, Cow-Pox and Chicken-Pox Illustrated by thirteen plates. By John D. Fisher, M. D. Second Edition. Boston: 1837.

† Description of the Discrete, Confluent and Inoculated Small-Pox, Varioloid Disease, Cow Pox and Chicken-Pox. By John D. Fisher, M. D. Plate 5.

‡ *Small-pox, etc., J. D.* Fisher, M. D., pp. 3–4.

Figures 89 and 90, Plate 21, represents varioloid pock, which appeared on a little girl six years of age. Figure 89, second day of eruption. Figure 90, fourth day of eruption. This little girl had been vaccinated when an infant, and the vaccine scab was strongly marked on her left arm. She had been confined to the sick ward in the Hôpital des Enfans Malades of Paris in the summer of 1826, and whilst she was recovering from a slight fever, a girl fourteen years of age who occupied a bed near to the one she lay in, was taken sick and broke out with the confluent small-pox. Just sixteen days from the exposure of the little patient to this case of confluent small pox, about twenty pimples were discovered on different parts of her body. The eruption broke out without any or very little previous illness, which would not have been noticed had it not been succeeded by the eruption. A slight degree of langour, and a little dizziness and pain in the head, attended with a partial loss of appetite was all the symptoms that were observed. The eruption first showed itself on the upper and inner part of the thigh, and was vesicular when discovered. A few pimples were next seen on the face, trunk and hands, and were papular on their arrival at the surface, but before the termination of the first day their tops were converted into regular vesicles, containing a light straw-colored serum. On the fourth (Figure 90), they had gained their full size, and the matter which they contained began to concrete and dry up.

On the sixth day the virus had completely dried up, and the surfaces of the pocks were covered with dry, light brown scabs. On the *eighth day* these scales or scabs had become harder and of a darker color and began to crumble off. During the march of the eruption the patient suffered but little and experienced no secondary fever, and was as playful and lively as usual. She remained during all this time in the ward in which she was taken sick, and continued to sleep in the same, notwithstanding the one next to it was occupied by the girl who was sick with confluent variola. After the scabs had separated and fallen, purplish depressions or marks remained in the skin for some days, but then disappeared by degrees and in three weeks every vestige of the pocks had disappeared.†

Figure 87 and Figure 88, contain an accurate copy of an eruption of the natural small-pox, as it appeared on the hand and round the eye of a laborer on the SEVENTH DAY after it broke out. The pustules were very numerous and were coherent and were piled upon each other, but were not confluent, and had passed into a state of suppuration. They were perfectly round and varied in size in the different regions on which they existed. They were much larger and more globular on the hand than round the eye, as represented in the figures. On the hands and feet the pustules were of the tubucular or warty kind, and differed from those of the face and trunk, and from the more common eruption, in being more compact, harder and less prone to suppuration. Every part of the body of this patient was nearly as thickly studded with the pustules, as the regions here represented, and the eyes even were invaded by the eruption, and the sight of one of them, as shown in Figure 87, was destroyed by a pustule which appeared over the pupil.‡

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*Small-pox, etc., John D. Fisher, M. D., p. 35.

†Small-pox, Fisher. p. 37.

‡Small-pox, etc., by John D. Fisher, M. D., Boston, 1834, p. 42.

VARIOLA MALIGNA—VARIOLA HÆMORRHAGICA.

This fatal variety of small-pox was called by the early writers Variolæ Nigræ. The blood appears to be poisoned from the first by the disease, being rendered florid and watery. When drawn from a vein a large part of it will be found to be serum, and what ought to be the crasamentum remains almost fluid; it is principally coloring matter; the fibrin seems to have disappeared. The countenance of the patient is sunken, the breathing anxious, and in some instances death takes place before the eruption has been developed, leaving it doubtful whether the disease was small-pox, scarlet-fever, or some other form of idiopathic malignant fever. The eruption is rather slowly developed. There is hemorrhage from some, and occasionally from all, or nearly all, of the mucous surfaces; from the nose, from the mouth, from the air passages, from the bowels, from the uterus and vagina. In the female there is invariably hemorrhage from the uterus and abortion in cases of pregnancy, and the fœtus is usually born dead. Hemorrhage frequently occurs from the kidneys, and the urine is loaded with blood. Albumen with granular casts may appear in non-malignant cases of small-pox, but the presence of blood in the urine of this disease must be regarded as a symptom of the most serious import.

A patch of effused blood under the conjunctiva, appearing early in the attack, should always be looked upon as a most dangerous symptom. In some instances blood oozes from the ears and eyes. Livid patches from effused blood are formed on the surface of the body, and blood is mixed with the fluid formed in the small-pox vesicles which can scarcely be said to become pustules. There is great depression, but the intellect usually remains clear to the last without delirium. A confluent eruption generally accompanies the malignant form of small-pox, and death commonly takes place on the fifth day of the eruption.

Petechial small-pox presents very nearly the same characters as malignant small-pox; the condition of the blood is very much the same in these two varieties of the disease. In Petechial small-pox numerous little dark spots, resembling flea-bites, especially about the arm-pits and groins, are observable, and the skin in these parts has a greenish-yellow hue, very like what is seen around a severe bruise.

DEVELOPMENT AND STRUCTURE OF THE SMALL-POX PUSTULE.

The eruption or formation of the small-pox pustule has certain definite stages in its development; it runs a given course of about eleven days, and its progress undergoes many mutations; it is at first a papule, then a vesicle, then a pustule, and lastly it forms a scab or crust. The various changes form so many *stadia* of unequal duration.

The first or stage of *papule*, lasts from *twenty-four to twenty-eight hours.*

The second or *vesicular* stage lasts *four days.*

The *last* stage, or that of *scabbing*, lasts *three days more*, making the whole duration of the *normal* pustule ten or eleven days.

There are varieties, however, of small-pox, in which the formation of the pustule is irregular, as in the Hemorrhagic, confluent and horne small-pox. In the horne small-pox the two last stages are singularly shortened or absent altogether.

When the eruption of small-pox is of the *distinct variety*, its first appearance consists of a number of small red papules, about the size of a pin's head, more or less numerous, but separate and distinct from one another, and scarcely salient. They commence with a circumscribed hyperaemia of the true skin, extending into the subcutaneous tissue. The cells of the *Rete Malpighii* swell up the papillae elongate, and the red spot of skin becomes a sharply-defined nodule, perfectly solid, and having a flattened top.

On the second or third day of the eruption, the second stage towards the development of pustules commences. A small vesicle, which gradually enlarges, bound down and depressed in the centre, or *umbilicated*, forms on the apex of each pimple, by elevation of the outer layer of the epidermis, and contains a clear whey-colored fluid. This vesicular stage lasts almost four days, when the vesicle maturates or "ripens" into a pustule. This process is so gradual, that if the pustule be examined closely about the fifth or sixth day, a central whitish disc of lymph may be seen, set in or surrounded by a circle of yellowish, puriform matter. According to the testimony of Watson and others, there is in the centre a *vesicle*, which is distinct from the pus, so that you may puncture the vesicular portion and empty the contents without letting out any of the pus; or you may puncture the part containing the pus, and let that out without evacuating the contents of the vesicle. The vesicles have even, by careful dissection, been taken out entire. The pus cells form from the *young* cells of the *Rete Malpighii.* The adherence of the altered cuticle to the cutis at some points, and its separation at others, produces the little compartments or dissepiments spoken of by some writers. These cavities are usually irregular in shape, and contain a white substance of the consistence of pulp or thick mucous, which at first was supposed to be the specific exudation of small-pox. It is now ascertained that it is no pseudo-membrane, but is composed of the deeper and softened layers of the epidermis. This "*disc*" of softened epidermis covers the interior of the pustule, and extends from the centre to the raised circumference of the pustule in diverging rays, forming part of six or eight fan-like chambers of nearly equal size. In the structure of this disc the following elements are distinguishable from without inwards: (1), large flat cells; (2), large cells not so flat, but more globular and mucous; (3), nearest the cutis are the cells and tissue of the *rete mucosum.* (Gruby, Gluge, Rayer, Gustav Simon, and other observers and systematic writers, as William Aitken.)

The variolous pock has been carefully examined with a view of describing its structure, by John Hunter, Dr. Adams, Petzholdt, Erasmus Wilson, Dr. Gustav Simon, Sir Thomas Watson, Dr. Heming, and others; but it would be foreign to our purpose to present an extended view of the opinions of these various writers, and the above concise statements of the condition of our knowledge on this subject will be still further illustrated by the following description, by Carl Wedl, in his *Rudiments of Pathological Histology.**

"External integuments—exudations in this situation, are particularly fitted for study, being accessible to observation, even during life. The most frequent are those which take place in the cutaneous *papillæ*, in which they are either confined to small limited districts, in which the exudation takes place around isolated groups of papillæ, or are more extensive. An instance of the former kind, or of a limited exudation, is afforded in small-pox, in which the spots are at first filled with a limpid fluid, containing nothing but molecules, and do not become pustules till afterwards, when pus-corpuscles are developed in the hyaline exudation. The transudation takes place from the capillary system of the *papillæ*, the exudation as it is poured out gradually accumulating between the under surface of the *epidermis* and the upper surface of the *corium.* But since the process is confined to limited groups of *papillæ*, the epidermis covering the latter is raised in the form of a transparent vesicle, while the spot at which the hair escapes from its sheath, together with the excretory duct of the sebaceous follicle, remains depressed, and constitutes the central *pit* of the vesicle. In those parts of the skin where no hair or sebaceous follicles exist, as in the palm of the hand and sole of the foot, the exudation deposited around a point where several of the deeper grooves in the *corium*, meet, may cause a similar pit, since in a situation of this kind the *epidermis* constitutes a stronger layer and is of closer texture. When the puriform fluid in the pustules begin to dry up, the pit becomes shallower and wider, owing to the subsidence of the swelling. In the integuments of a subject dead of small-pox, it is easy to perceive that the vessels of the *papillæ* are more or less injected, when the skin has been macerated long enough to allow of the removal of the *epidermis*, beneath which the isolated patches of vascular injection are immediately apparent. Perpendicular sections show that the *papillæ* are the constant and principal seat of the injection, and it is from these vessels that the hemorrhage takes place, in cases of petechial small-pox."

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*Translated by George Busk, F. R. S.; Sydenham Society, p. 206.

The poison of small-pox is believed to be most active just at the period when the clear contents of the vesicles begin to turn cloudy. While the maturation of the vesicle, into a pustule is going on, a damask red areola forms around each pustule; and as the vesicle fills, the whole face swells, and often to so great a degree that the eyelids are closed. When the eruption is completed the "bridle" which bound down the centre of the vesicle, ruptures, and the pustule now becomes *spheroidal* or *accuminated.* About the eighth day of the eruption a dark spot is seen on the top of each pustule. At that spot the cuticle ruptures, allowing matter to exude, which conceretes into a scab or crust; and during this process the pustule shrivels and dries up. The crust is detached between the eleventh and fourteenth days, leav-the cutis beneath of a dark reddish brown hue, a discoloration which lasts many days, or even weeks. On the face, however, the pustule often penetrates or burrows, so as to cause ulceration of the *rete mucosum*, leaving a permanent cicatrix in the form of a depression or "pit." The cicatrix thus formed, though at first of a dark reddish brown, ultimately becomes of a dead white color.

The small-pox eruption does not appear on the whole body at once, but appears in three successive crops. The first crop covers the face, neck and upper extremities; the second the trunk, while the third appears on the lower extremities. There is usually an interval of several hours between each crop; and the later the papules are in appearing on the trunk and lower extremities than on the face and neck, by so much the later they are in maturing and disappearing from these parts. When the eruption on the face is declining, that upon the extremities has scarcely yet arrived at its height, so that the hands and feet are then considerably swollen. This is to be regarded as a favorable sign, in so far as it indicates a certain sign of constitution.

The number of pustules sometimes does not exceed five or six over the whole body; more commonly they number from one to 300, and occasionally amount to several thousands. It has been calculated that if 10,000 pustules be counted on the body that 2000, at least, will be found on the face; and accordingly the number of the pustules on the face being in proportion, those on the other parts of the body furnish a fair estimate of the extent of the disease and of the danger of the patient.*

CHANGES OF THE TEMPERATURE AND URINE IN SMALL-POX (VARIOLA) AND IN MODIFIED SMALL-POX VARIOLOID.

The following observations and chemical researches were made by the author, chiefly during the recent Civil War (1861-1865), when the camp life permitted isolation and continuous labor, without the interruptions attending private practice.

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* The Science and Practice of Medicine. By William Aitken, M. D., Edinb., Prof. of Pathology in the *Army* Medical School, Philadelphia, 1872. Vol. 1, pp. 376-378.

CHANGES OF TEMPERATURE IN SMALL-POX.

The fever of this disease, as well as that of measles, scarlatina, typhus and typhoid fevers, in like manner with those of hospital gangrene and surgical fever, is due to the contamination of the blood by a specific organic poison.

The matinal producing small-pox being definitely related chemically and physiologically to the organic constituents of the living body, the development of the disease is traceable through well marked stages.

During the period of incubation (the duration of which varies within narrow limits, according as the poison has been introduced by the mucous or cutaneous tissues, in the former case, or natural small-pox, the period of latency varying from ten to fifteen days, and in the small–pox produced by inoculation, from seven to nine days), the specific poison absorbed gradually infects the blood, rendering it contagious in its properties, and excitant and irritant to the nervous system and circulatory apparatus.

The infection and alteration of the blood during the period of inoculation in small-pox gives rise to the secondary stage of primary fever, lasting from two to six days, till the eruption appears, when, in most cases, it remits. This stage is characterized by fever, the temperature of the axilla rising to 106° F. and even higher; severe muscular pains, especially in the small of the back; nausea and in some cases obstinate vomiting, oppression of the brain, drowsiness, stupor and even coma, and occasionally convulsions.

During the fever and prior to the appearance of the eruption, the intense pain in the back is a symptom of great importance as giving a warning as to the character of the disease. The pain in the back is a peculiar and striking symptom, and is more intense than in any other form of fever. It is distinguished from lumbago by its position; that in lumbago affects the muscles on each side of the spine, and is greatly aggravated by movement; while the pain of the back in small-pox is in the central part of the *sacrum* and the lumbar region, and is not influenced by movement.

During a series of investigations and post-mortems on small-pox in 1864, I suffered with all the symptoms of the first stages of this disease, and experienced the most intense pain in the back; this pain was even greater than that which I suffered subsequently in 1873 from dangue, and in 1878 from yellow fever.

Three views have been advanced, as to the source of this characteristic pain in small-pox.

(1.) Hyperæmia of the spinal medulla.

(2.) Pressure on spinal nerves as they emerge from the *lumbar* and *sacral* regions by the distended venous plexus surrounding them in the bony outlets.

(3.) Excessive hyperæmia of the kidney, or incipient nephritis in the connective tissues of the kidney.

In severe cases of small-pox I have detected albumen and urinary casts in the urine, and the pain may, in some degree, be due to hyperæmia of these organs, but is most probably referable to congestion of the spinal cord.

On the evening of third or morning of the fourth day, after the commencing of chill, the fever is usually at its height; and on the fourth day, sometimes sooner and but seldom later, the eruption appears, and the third stage commences, the phenomena of the third stage are as a calm succeeding to a storm; for on the appearance of the eruption, the fever remits, the heat abates, the affection of the head subsides, the vomiting ceases, and the pulse returns to its natural standard. The febrile phenomena seem to have altogether disappeared for the time, and the patient may think himself well. A temporary defervescence is thus well marked, the temperature falling from, perhaps, 106° F. progressively downward to 100° F.

On the first or second day of the disease the temperature may attain a considerable height, seldom below 40°c (104°F.), and more often above it; and this rise may occur in an unbroken line and with extreme rapidity, or it may occur more slowly and reach the elevation on the second evening. On the second day the temperature may have already attained its maximum, or may still exhibit a moderate increase on the third or on the fourth day, with which only very slight remissions occur in the morning hours.

According to Dr. C. A. Wunderlich :*

> "The *maximum* temperature of the initial stage or prodromal fever is only exceptionally less than 40°c (104°F.), generally somewhat above that, sometimes even 41°c (105.8°F.), or indeed a few tenths more.
>
> "When the maximum has been reached a slight fall immediately ensues, which generally lasts only one day. At this time we may commonly notice the first traces of the eruption in the form of spots. This stage lasts from two to five days, and it is not possible at this time, from the course of the temperature, to discriminate small-pox from exanthematus typhus, relapsing fever, or from a pneumonia which as yet affords no local evidence of its presence; and even when the other symptoms are taken in conjunction, it is seldom that we can speak with complete certainty. Yet, on the one hand, every day that the fever lasts, without the lung symptoms render pneumonia less probable; and, on the other hand, if the fifth day of the disease pass over without any eruption making its appearance, the presence of small-pox must be considered very doubtful.
>
> "Soon after the first development of the variolous papules, *the temperature falls more or less rapidly*. In rare cases of the disease this defervescence occurs as early as the second or third day of the disease, but generally from the fourth to the seventh day. The downfall lasts only twenty-four hours or less, in which case it is continuous; or two, or, indeed, even three days, when it is generally not continuous, or, in other words, it is interrupted by a moderate evening exacubation. * * *
>
> "The falling temperature after the prodromal stage either never gets down to normal, sometimes remaining sub-febrile, but generally at decided febrile degrees, and continuing in this fashion for several days, with or without daily fluctuations; or the normal temperature is reached, if at all, tediously, and defferveseence is by lysis."

About the fourth day of the eruption, and about the eighth day of the disease, inclusive, from the first attack of the primary fever, when the eruption is fully out, and the most advanced pustules commence to maturate, the commencement of suppuration is announced by the swelling of the integument, and especially of the whole face, head and neck. During this period of intumescence (generally lasting three days), simultaneously with the renewed hyperamia of the skin, and introductory to the change taking place in the cavity of the pustules, the fever, which had remitted, returns, and the last stage, or that of secondary or suppurative fever, commences. In rare cases of extraordinary interest, this stage is marked by a rise of temperature to a considerable height (104°, 105°, and even in the case of Colonel Nat. Offut, my hospital student, to 111°c,) by acceleration of the circulation, and by slight delirium and rigors. In cases of greater intensity, severe delirium, a harsh, dry, cough, and hemorrhages from the kidneys and lungs and bowels may be added to the other symptoms.

In many cases the secondary fever, and the swelling and redness of the face, having lasted from three to five days, subside, and the now fully ripe pustules burst and discharge a thin, yellow matter, which concreting into a crust, falls off on the fourteenth or fifteenth day, and the disease terminates. During these changes the secondary fever of small-pox disappears, and the temperature sinks gradually to the normal standard.

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*On the Temperature in Disease; Sydenham Society; London, 1871; p. 339.

The secondary fever of small-pox is clearly related to the suppurative process, and without doubt has much the same origin as uncomplicated inflammatory fever accompanying mechanical injury or amputation, or suppurative inflammation of some important organ. It is mainly due to the absorption of the serum of the pus, and of the products of the inflammatory exudations.

In many cases the secondary (suppurating) fever is of indefinite duration, varying in accordance with the intensity of the disease; and at the same time its course and the height of the temperature differ according to the danger and severity of the disease. In small-pox of moderate severity the temperature in this stage scarcely reaches 39°c (102.2° F.) in general, and very rarely 40°c (104°F.) or more; there are morning remissions, and the duration is usually only a few days. In some cases the temperature is considerably higher; the course is sometimes remittent, with very marked exacerbations, and sometimes continuous with occasional isolated elevations of temperature.

Irregular fluctuations very often mark its course. If, during the fever of suppuration, the temperature several times exceeds 40°c (104°F.), it is a sign of great danger. In cases not fatal the duration of the secondary fever is seldom less than a week.

In favorable cases the fever depresses by lysis, in a very gradual manner, and sometimes at the time of scabbing, there is an occasional prejudicial but brief rise of temperature, or the fever may even continue till desiccation, and it may even be longer.

In *fatal* cases, the temperature may rise rather quickly from moderate heights to very considerable degrees, and death may occur at 42° c. (107.6° F.), or even more, although during this stage the patient may die with only moderate elevation of temperature. Simon (*Charité Annative*, 13, *Bd.* 5) has published cases in which the temperature (which was, however, measured after death) was 43.75° and 44.5° c., respectively, (110.75° and 112.1°).

Serious complications may cause intercurrent attacks and irregularities in the temperature, which, however, presents nothing specially characteristic of small-pox.[*]

CHANGES OF THE TEMPERATURE IN VARIOLOID OR MODIFIED SMALL-POX (SMALL-POX AFTER VACCINATION).

Small-pox as modified by vaccination, received the name of VARIOLOID, first suggested for it by Dr. John Thompson, of Edinburgh, who wrote a work on the subject in 1820; and this word has been adopted generally in Europe and America by writers on small-pox.

Small-pox after vaccination presents various degrees of severity, and modification, from the slightest form of which there is none, or hardly any eruption at all, to the most confluent cases, closely, often exactly resembling the disease in the unvaccinated; and it also assumes the petechial and malignant types after vaccination just as in the unvaccinated state. This depends in a large measure upon:

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[*] Investigations upon the Nature, Causes, and Treatment of Hospital Gangrene, as it prevailed in the Confederate Armies, 1861-1865; by Joseph Jones, M D. Surgical Memoirs United States Sanitary Commission; New York. 1871, pp, 355–361.

C. A. Wunderlich; Archiv fur physiol, Heilkunde, N. F. 2, 18, 1858. Leo; Archiv der Heilkunde, 4, 41, 1864; Frohlich, ibid, 1867, v. 8. 420; Korber, Petersb Zeitschrift, 13, 303 On the Temperature in Diseases; a Manual of Medical Thermometry, by Dr. C. A. Wunderlich, New Sydenham Society; 1871,. pp 337–341, table 4. The Science and Practice of Medicine, by William Aitkin; Philadelphia, 1872, vol. 1, pp. 376–398.

1. The matter with which the patient has been vaccinated.
2. The mode in which the vaccination has been performed.
3. The length of time which has elapsed since the performance of the vaccination.
4. The state of the constitution of the patient at the time of the eruption of the variolous poison.

Dr. J. F. Marson, Resident Surgeon to the London Small-Pox Hospital, has published the following valuable table, illustrating the effects of the mode of vaccination upon the subsequent attacks of small-pox (varioloid):

TABLE.

Analysis of all the Cases of Small-pox after Vaccination, admitted at the Small-pox and Vaccination Hospital, London, for a period of twenty years, viz: from 1836 *to* 1855, *inclusive, showing, from a careful examination of the Cicatrices, the relative amount of security given by the number of Vesicles produced at Vaccination; and, judging from the character of the Cicatrices, the probable state of activity and efficiency of Lymph used after Vaccination.*

PATIENTS ADMITTED WITH SMALL-POX.	Number of Patients.	Character of Cicatrices.	Cases.	RESULTS.				
				Discharged.	Died.	Died Affected by Super added Diseases.	Ratio per cent of Mortality from Small-Pox, after deducting entirely Cases affected by Sup er added Diseases.	
1. Having one vaccine cicatrix.....	2,001	Good.	1,032	978	54	15	3.83	7.73
		Indifferent.	969	835	134	21	11.91	
2. Having two vaccine cicatrices	1,446	Good.	873	841	32	12	2 32	4.70
		Indifferent.	573	516	57	10	8.34	
3. Having three or more vaccine cicatrices....	518	Good.	307	300	7	4	0.99	1.95
		Indifferent.	211	202	9	2	3.34	
4. Having four or more vaccine cicatrices	544	Good.	358	356	2	0	0.55	0.55
		Indifferent.	180	183	3	2	0.54	
5. Stated to have been vaccinated but having no cicatrix	370	....	370	269	101	18		23.57
5. Stated to have been vaccinated but particulars of cicatrix not recorded..........	17	....	17	14	3	.....		6.66
Total.	4,896	....	4,896	4,494	402	86		6.56

Dr. Marson describes a good vaccine cicatrix as distinct, foveated, dotted, or indented, in some instances radiated, and having a well, or tolerably well-defined edge; an indifferent cicatrix is indistinct, smooth, without indentation, and with an irregular, well-defined edge.

According to the preceding statistics, and in accordance with the valuable experience of Dr. Marson, the aggregate mortality with *good* vaccine cicatrices, from small-pox alone, uninfluenced by other diseases, is 2.25 per cent.; with *indifferent* vaccine cicatrices, from small-pox alone, uninfluenced by other diseases, 8.82 per cent.

There is found to be a mortality of about two per cent. in vaccinated as well as unvaccinated patients from small-pox, being complicated with antecedent or superadded diseases.

Three-fourths of the cases had taken the vaccination in but one or two places, and among these, by far the largest proportionate mortality from small-pox has fallen. By vaccinating so as to take effect in four or more places, we not only save life, but prevent a great deal of suffering and subsequent damage to the appearance of the person, which, in females at least, is of great consequence, and not always quite a matter of indifference to males.

Of 544 cases having four or more vaccine cicatrices, not one-half of one per cent. died of small-pox, or one in 200; whereas of 969 cases, with only one indifferent vaccine cicatrix, almost twelve per cent. died.

Of 370 persons who believed themselves vaccinated, but who had no cicatrix to show for having been vaccinated, but who trusted to it for their protection, died of small-pox at the rate of twenty-three and one-half per cent.

The security of vaccinated persons gradually rises, not only from the number of cicatrices produced at vaccination, but also according to the *quality* of the cicatrices. Active vaccine lymph, such as leaves clear, permanent cicatrices, is evidently indicated as the most desirable to select for use in vaccination.

According to Dr. J. F. Marson, "In the course of years vaccine lymph becomes humanized, by passing many times through the subject, and can only be kept in a great state of efficiency by having many subjects constantly to select from for its continuance, and even then the cicatrices it leaves, after many years' use, are not so good as they were formerly.

"Out of large numbers of cases of small-pox after vaccination, viz., 1,958, admitted into the Small-pox Hospital during the years 1863 and '64—small-pox having been epidemic in London throughout these entire years—the mortality shows a considerable increase, by from 6.56 per cent. for twenty years—1836 to 1855—to a mortality of 9.2 per cent. out of 1,958 cases for the years 1863 and '64; all patients manifesting antecedent or supervening diseases having been deducted from the calculation.

"It is a question that may be fairly and properly entertained, and deserves very mature deliberation, whether we ought not to resort more frequently than has hitherto been done to supplies of lymph from the cow."*

Modified small-pox, or varioloid, is characterized by the comparative mildness of the symptoms, the pustules being cut short in their development by vaccination or a primary attack of small-pox.

The principal varieties of modified small-pox (varioloid) have been thus classified by systematic nosologists:

1. A fever of three days, without eruption, affecting people during variolous epidemics *(variolae sine variolis vel eruptione)*.

2. A high and severe fever, followed by a very mild eruption, sometimes only a single pock; the slight proportion which the amount of eruption bears to the severity of the preceding fever is perhaps the most marked characteristic of varioloid.

3. The occasional appearance of a scarlet efflorescence, like that of scarlatina or roseola, preceding the appearance of the proper pimples, which occur as a very scanty crop.

4. In some rare instances the eruption is confluent, but does not advance beyond the development of a pimple or vesicle, and begins to dry on the fourth or fifth day of the eruption, forming a small, hard tubercle, which soon disappears.

5. Sometimes the eruption is pimple, vesicle and pustule at one time in the same case.

6. Sometimes the eruption runs its regular course, but stops sooner, sometimes on the sixth or seventh day, instead of the eighth or ninth. In general, it may be stated that the severity and fully developed state of the disease is in proportion to the length of time which elapses from vaccination.

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*Small-pox, J. F Marson; System of Medicine, by J. Russell Reynolds; Philadelphia, 1879; vol. 1, pp. 153 and 154.

7. The varioloid eruption wants the peculiar odor of natural small-pox, and secondary fever is very rare.*

It may be stated in general terms that in varioloid, after an intense continuous fever, lasting a few days, a final exacerbation terminates the fever suddenly and simultaneously, with the development of the small-pox pimples. A rapid and perfect defervescence then ensues, the temperature decreasing seven or more degrees, Fahr., within thirty-six hours. From this event the patient remains entirely free from fever—*provided there exists no serious complication*—in spite of the continuous and progressive development of the small-pox pimples into pustules, and even in spite of the successive eruption of new pimples.

It is evident, therefore, that the fever in small-pox exhibits *two distinct types*, which closely correspond at their commencement.

These two types correspond to the two chief modifications of small-pox; one a brief *continuous* form, belonging to modified small-pox or *varioloid*, occurring chiefly, although not exclusively, in vaccinated or inoculated persons; the other a *relapsing* type, which characterizes the *unmodified small-pox (variola vera)*, which runs its course with fever in the suppurating stage.

The course of the temperature in the initial stage will not suffice to distinguish between *true variola and varioloid*, but as soon as the exanthem develops itself the course of the temperature is not only the most certain, but the only certain, criterion by which true small-pox may be distinguished from the modified form. Not only in the occurrence of a more or less developed secondary or suppurative fever the most trustworthy means of diagnosis between the two fevers, but the mode of defervescence of the eruptive fever gives an almost infallible indication as to the kind of further course of the disease.

The initial period is common to both types *(variola* and *varioloid)*. In the first or second days of the disease the temperature attains a considerable height, seldom below and often above 104° F.; the maximum temperature of the initial stage or prodromial fever reaching in many cases, and even exceeding, 106° F.

Soon after the first development of the variolous papules *the temperature falls more or less rapidly.*

In cases of uncomplicated *varioloid* the temperature quickly reaches by this defervescence, or falls down a trifle below it, and thenceforth remains normal or pretty nearly so, unless the occurrence of some complication causes a fresh rise, which is but seldom the case.

When the eruption in modified small-pox *(varioloid)* is very copious there may sometimes occur a slight (scarcely febrile) and seldom febrile elevation of temperature at the time when the pustules are desiccating, but this does not last long in any case.

This fall of temperature is the best characteristic of *varioloid*, especially when regard is had to the fact that the defervesence is not simultaneous with the full development of the eruption, but occurs soon after that begins, even at the time the spots begin to be papular, or to be distinctly felt as elevations.

CONSTITUTION AND CHANGES OF THE URINE IN VARIOLOID (MODIFIED SMALL-POX), AND IN VARIOLA VERA (SMALL-POX).

The urine of small-pox presents changes corresponding, to a certain extent, with the four well marked stages of the disease.

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*Science and Practice of Medicine, by William Aitken, M. D.; Edinburgh; Philadelphia, 1872; vol 1, p. 388.

In this disease, the urinary excretion presents uniform characteristics; namely, great concentration, increase of the urea and uric acid, phosphoric acid, and sulphuric acids, and diminution and even total disappearance of the chloride of sodium.

The urine of modified small-pox (*varioloid*), slso presents marked differences from that of true uncomplicated small-pox.

The table contains a consolidated statement of the results of the author's labors upon the changes of the urine in varioloid and variola during the civil war (1861-1862).

TABLE OF OBSERVATIONS UPON THE PHYSICAL AND CHEMICAL PROPERTIES, AND CONSTITUTION OF THE URINE IN SMALL-POX—BY JOSEPH JONES, M. D., SURGEON PROVISIONAL ARMY OF THE CONFEDERATE STATES.

Name of Patient, History of Disease, etc.	Date.	Physical Properties and Chemical Constituents of Urine.								
		Amount of Urine collected during 24 Hours, Grains.	Specific Gravity.	Color.	Urea excreted during 24 hours, Grains.	Uric Acid, Grains.	Free Acid Grains.	Grains, Phosphoric Acid.	Grains, Sulphuric Acid.	Chlorides, Grains.
Varioloid.—Light Case.—J. J. Cobb, private, C. S. A. Age 31. Oct. 31, 1864. Variolous eruption very slight; pustules small and few, and the patient walks about; appetite pretty good. The first symptoms made their appearance about five days ago. Pain in head, limbs, and back, with fever. Eruption first noticed Oct. 30. Nov. 1. Pustules increasing somewhat in size, but still small; patient dressed and walking about; eruption so slight that the character of the disease might escape observation; heavy deposit of urates in urine. Nov. 4. Pustules disappearing; they aborted.	Oct. 31, 1 P. M. to Nov. 1, 1 P. M.	5,865	1,029	Deep orange red	227.89	7.22	16.77	15.51	41.63	Trace
	Nov. 5	13,424	1,015-5	Orange yellow	239.93	8.00	14.22	15.57	48.74	38.80
Case of Well-Marked Varioloid.—Severer than the preceding, and approaching more nearly to distinct small-pox. Pustules large, well-formed, but scattering. W. B. Aiken, Company A, 30th Regiment, Georgia Vols. Age, 30. Had headache, and pain in back and limbs, Oct. 24. 1864. Two days after on the 26th, the eruption made its appearance. Oct. 31. Pustules sparsely scattered over the face, but large and well filled. Patient up and about: appetite rather poor; complains of sore throat. Nov. 1. Pustules still in process of formation; heavy deposit of urates in urine. Nov. 4, eight and a half A. M. Pustules large and distinct, fully formed, and drying. Patient, as before, up and dressed and walking about; has taken a dose of Epsom salts.	Nov. 1	7,325.7	1,028.5	Orange red	222.33	10.85	28.30	26.98	24.73	14.14
	4	8,146.9	1,036.5	Light orange	260.53	10.80	38.01	27.79	88.52	10.32
Case of Small-Pox.—Austin, negro man. Oct. 25, 1864. Eruption appearing. Oct. 28. Eruption three days out; patient has cough; pulse but little above healthy standard, 88 per minute. Tongue very slightly coated; appears to be doing well; confined to bed. Oct. 29. Progresses favorably; pulse, 88; pustules distinct, and comparatively few; urine high-colored and concentrated, with heavy deposit of urates. Oct. 31. Patient doing well; tongue only slightly coated; voice hoarse; pustules forming well; heavy deposit of urates and uric acid. Nov. 1. Pustules filled and drying; continues to improve; appetite good. Nov. 4. Continues to improve; pustules drying, large and distinct; appetite good; urine clear.	Oct. 29	6,495	1,031	Deep orange red	434.56	6.80	25.24	22.54	19.93	Trace
	30	9,322	1,024.5	Deep orange red	407.61	12.00	32.42	32.60	23.95	4.63
	31	16,967	1,016	Deep orange red	376.52	11.66	24.68	30.70	56.24	48.97
	Nov. 1	26,999	1,015	Orange	443.58	16.90	39.14	32 51	24.11	84.94
	4	23,866	1,016	Orange	555.84	18.60	46.32	46.32	31.38	63.84

Small-pox.—Charles, negro man. Age, 38. Stout, black negro. Taken with fever and headache, Oct. 23, 1864. Eruption made its appearance three and a-half days after, on the 27th of Oct., 1864. Pulse full and good, 82 per minute; eruption quite full, but not confluent; has what appears to be a vaccine scar, and says that he was vaccinated when a youth; urine deep red and concentrated; lets fall heavy deposits of urates. Oct. 30. Eruption coming on fully in face and scattering on breast, but fuller on thighs; tongue slightly coated, and red at tip and edges; heavy yellow deposit in urine. 31st. Heavy deposit in urine. Nov. 1. Pustules filled; patient doing well; still confined to bed. Nov. 2. Continues to improve; pustules drying; appetite improving. Nov. 4. Pustules drying; patient continues to improve. Nov. 5. Continues to improve.	Oct. 29	9,593	1,024	Deep orange red	450.14	7.18	29.83	33.06	30.81	Trace
	30	9,243	1,027	Deep orange red	415.02	10.41	25.93	29.39	31.30	Trace
	31	17,927	1,029.5	Deep orange red	400.97	9.31	28.37	32.60	26.98	Trace
	Nov. 1	7,457	1,030	Deep orange red	348.05	15.30	28.36	33.28	24.94	2.13
	2	10,280	1,028	Deep orange red	422.36	12.16	29.59	37.54	29.94	24.60
	5	11,770	1,023.5	Deep orange red	355.04	9.49	28.17	29.30	26.44	33.81
Small-pox.—January, negro man. Age, 24. Light case of distinct small-pox. Had pain in head and back on the 25th of Oct., 1864. Eruption made its appearance on the 27th of Oct. Nov. 1. Patient doing well; urine deep-colored. Nov. 4. Pustules out in large numbers, fully formed, just beginning to dry upon surface; appetite good.	Nov. 1	6,444.9	1,023	Orange	240.86	6.40	23.16	27.79	15.64	1.85
	4	19,544	1,018.5	Orange	602.79	9.27	65.90	55.95	46.86	3.65
Case of Confluent Small-pox.—James Graves, 2d Regiment Georgia Reserves. Was taken with a chill, followed by high fever, Oct. 26, 1864. Has had high fever up to the present time, Nov. 1. The eruption attracted notice first on the night of the 27th, three days ago. At the present time, Nov. 1, face covered with eruption, and much swollen; eyes irritated and discharging matter; pustules confluent; heavy deposit in urine. Nov. 4. Confluent eruption encrusts the entire face, like a filthy mask. Nov. 5. Continues to improve; pustules drying.	Nov 2	9,713	1,022.5	Bright red	351.29	11.11	45.62	68.43	24.27	Trace
	5	4,807	1,023	Red	176.01	4.50	21.84	15.74	19.66	Trace
Confluent Small-pox.—Sawney, negro man. Age, 22. Was taken with characteristic symptoms of small-pox, Oct. 25, 1864. Nov. 2. Pustules not well filled; confluent; patient delirious. Nov. 4. Pustules filled; confluent; mind clear; urine high-colored, concentrated, with heavy deposits of uric acid and urates.	Nov 4	12,264	1,022	Red	469.37	10.64	49.87	46.93	33.36	Trace

When it is considered that these patients partook of but little food, and were in a state of almost absolute rest, it is evident that the urea is considerably increased in the urine of small-pox, amounting in one case to over six hundred grains during the twenty-four hours. As a general rule. the increments of this constituent corresponded with the severity of the disease, being but little above the normal standard in mild cases of varioloid, and increasing to double and even treble the usual amount in cases of confluent small pox. In like manner, the uric acid and the phosphoric and sulphuric acids were increased. The excretion of these constituents furnishes a measure of the destructive metamorphosis of the blood and muscular and nervous systems during the progress of the disease. The uric acid and urates exist in such large amounts in the concentrated and scant urine of small-pox as to form heavy deposits upon cooling. Uric acid is in like manner largely increased in hospital gangrene; and this increase, as in the case of small-pox, must be referred to the derangement of the nutrition, and oxidization of the nitrogenized elements and constituents and tissues.

The great concentration of the urine in small-pox may be due to several causes, as the congestion of the kidneys, the peculiar constitution of the blood, in virtue of which the water is held more tenaciously in combination with the nitrogenized elements and constituents, and the large abstraction of this constituent of the blood during the morbid changes in the integument.

The rapid diminution and complete disappearance of the chlorides during the exudative and suppurative stages of small-pox is important, as illustrating the offices of these metallic salts in the animal economy. The chlorides disappear so completely from the urine of severe cases of small-pox, that nitrate of silver gives scarcely a perceptible turbidness, when added to the urine acidulated with nitric acid. The wide diffusion of the chloride of sodium through the solid and fluid portion of the earth's surface, and its similar diffusion throughout all animal substances in definite proportions, as well as the craving of men and animals for this substance, and its established beneficial effects when used as an article of food, point to the importance of this substance in the metamorphosis of animal tissues. It is now well established that this salt is constantly associated with certain animal matters, and essentially influences their chemical and physical properties, rendering albumen, casein, and fibrin more soluble, and modifying their coagulating properties. The influence which this salt exercises on these protean compounds, and upon the physical properties of the blood corpuscles, as well as its relations to urea and glucose, renders this view probable that it is capable of forming definite chemical compounds with certain organic bodies which are most active in the changes characteristic of inflammation.

Recent investigations upon the composition of inflammatory exudations, pus and muces, indicate that this salt discharges an important office in the metamorphosis of the inflammatory materials of various diseases, as pneumonia and small-pox.

And it is not unreasonable to refer the absence of this salt in the urine in small-pox, not merely to the diminution of the amount ingested with the food, but to its abstraction by the exudation, and the part which it plays in the metamorphosis of the organic constituents into organized cells and fibres.

We have thus established by the preceding observations that—

1. Cow-pox (vaccination) produces a profound change in the chemical constitution of the human body.

2. When the small-pox poison induces fever after vaccination, and the disease appears in a modified form, known as varioloid, the course of the

temperature differs in a marked degree from that of true small-pox; in the former the fever is continuous and forms but one paroxysm; in the latter the fever is intermittent or remittent.

In varioloid the fever subsides and disappears with the appearance of the eruption.

In small-pox, the fever often subsiding after the appearance of the eruption, reappears during the filling of the vesicles or eruption with pus.

3. In varioloid the increment of urea, uric acid, free acid, phosphoric acid and sulphuric acid in the urine is comparatively slight.

4. In small-pox there is a marked increment in the urea, uric acid, free acid, phosphoric acid and sulphuric acid.

5. The action of the vaccine virus tends to prevent secondary fever and rapid oxidation of the nitrogenesed and phosphorized constituents of the blood, muscles and nervous tissue.

6. It is evident that the cow-pox virus protects from small-pox, by producing profound changes in the chemical constitution of the solids and fluids of the human body.

SPURIOUS VACCINATION OR THE ABNORMAL PHENOMENA ACCOMPANYING AND FOLLOWING VACCINATION.

CAUSES OF THE VARIOUS DEVIATIONS OF VACCINE DISEASE FROM ITS NORMAL COURSE—DANGER OF THE INTRODUCTION OF OTHER DISEASES INTO THE ORGANISM BY VACCINATION, VACCINO-SYPHILTIC INOCULATION—POST-VACCINAL SYPHILIS.

No question is of greater importance to the citizens of the United States of America, than the arrest, prevention and exclusion of small-pox. This loathsome disease has in past times after its introduction by Europeans depopulated the native races of the North American continent; and but for the practice of vaccination by the Medical Profession of the United States, smallpox would find a permanent home in this great and growing country; and the facilities of travel by steamboat and railroad are so great that scarcely a citizen of this mighty republic would escape this foul pestilence. The question of the arrest and exclusion of small-pox is of especial interest to the citizens of Louisana, who in virtue of the geographical position of their State, hold the key to the Missisippi valley.

We have established by original investigation and by statistics derived from official sources, and consolidated especially for this inquiry, the great protection afforded by vaccination to the citizens of the Eastern, Middle and Southern States, whose settlement and history antedated by periods ranging from seventy to two hundred and more years, the announcement of the discovery of Edward Jenner.

It remains that the value of vaccination should be impartially considered in all its varied respects, and that all sources of accident, error and danger arising from this operation should be fairly discussed.

The experience gathered by the medical officers of the Southern (Confederate) Army during the great American Civil War of 1861-1865 was of great value, and opened an entirely new chapter in the history of vaccination.

At the present time the enemies of vaccination appear to be gathering renewed strength, from the apparent failures and accidents occasionally attending this operation.

Like all other great discoveries, vaccination has been at one time extolled for powers which it does not possess, and at others blamed for accidents for which it was not justly chargeable.

IN THE EARLY HISTORY OF VACCINATION, PROTECTIVE POWERS AGAINST CERTAIN DISEASES WERE ERRONEOUSLY ATTRIBUTED TO COW-POX INOCULATION.

Soon after the world was informed that the vaccine poison was preventative of the small-pox, a disposition was shown by physicians and speculative men to extend its influence and prophylastic powers to other diseases.

The idea was advanced, that the morbid action excited by the virus from the cow, could as well prevent other contagious distempers, as that one for which it was particularly employed; and if it was capable of doing such good in the human constitution it would be no less operative in the bodies of brutes.

Accordingly it was said that the plague of Syria, could be prevented by previous vaccination; but M. Valli who made the experiment on himself was seized afterwards by the plague.

This alleged power of vaccination in controlling the plague, attracted at an early period a considerable degree of attention, and Dr. Jenner received letters on this subject from many quarters.

The circumstances having been made known to the Spanish Consul at Morocco, a communication was transmitted to Sir Joseph Banks on that subject, and from him to Jenner.

The opinion of Jenner on this point was thus expressed.

"I never was so sanguine in my hopes of seeing the plague extinguished by vaccine inoculation as some of my friends were, as you may have seen by the few introductory lines which accompanied Dr. Carro's letters in the public papers." "I will just drop a hint; the vaccine disease, in my opinion, is not a preventive of the small-pox, but the small-pox itself; that is to say, the horrible form under which it appears in its contagious state is (as I conceive) a malignant variety. Now if it should ever be discovered that the plague is a variety of some milder disease generated originally in a way that may even elude our researches, and the source should be discovered from whence it sprang, this may be applied to a great and grand purpose. The phenomena of the cow-pox open many paths for speculation, every one of which I hope may be explained."

The prophetic hope of Jenner, breathed more than half a century ago, has and is being realized in our day by the investigations of Pasteur, Koch and others.

M. Valentine of Marseilles, in a letter to Dr. Samuel Mitchell of New York presented the following:

"I think it may be agreeable to you to become acquainted with a letter written by the Hospodar of Wallachia, to my friend, Dr. Carro, of Vienna. It was published a few months ago, in the *Bibliotheque Britanique*, a French journal published at Geneva. That Prince is well known to be one of the most learned, polite and liberal men of the present day. What he says on the plague seems to be worth a volume.

"*Sir*—I have received the letter you have done me the honor to write me, dated April the seventh, together with the work which accompanied it. I have perused the whole, with the lively interest which talents and intrepidity engaged in the cause of humanity, never fail to inspire. After having given so striking an instance of your confidence in the cow-pox, it was well worthy of the extent of your ideas, to seek a preventive against one of the greatest scourges of the earth. But you know, Sir, that I belong to a country where it is but too easy to make observations on the plague. I have seen this capricious disease assume all forms, and exhibit the most opposite symptoms. It has frequently appeared under the guise of an *inflammatory fever*, and then suddenly disclosing all the peculiar symptoms, so that most inexperienced physicians have been strongly deceived in prescribing blood-letting, which has produced the most fatal effects. Sometimes it commences its career by *an inflammation of the stomach*, accompanied by signs of a septic ferment, which infects the whole alimentary canal, attacks the nervous system, and assumes the character of a deadly malignity. Other persons seized by the disease, have had no other symptoms than those of uneasiness and surprising weakness in all the joints, so that the physicians could consider it only as a *slow fever, invading the whole nervous system*. From this proteiform variety of symptoms, we are to suppose that the pestilential miasmata, introduced into the mass of humours incorporated with them, and excite symptoms corresponding to the peculiarity of constitutions in the sick; and that we are to respect a remedy which promises uniformity either to prevent this distemper, or to cure it.

"Mr. Valli, on his passage through Bucharest, owned to me that his experiments with cow-pox had taught him nothing. [Dr. Valli returned from Constantinople to Italy. This is the man who inoculated himself for the plague, and who shut himself up in a pestiferous hospital at Constantinople. All the hopes he once entertained of preventing the plague by vaccination are vanished.] And the notion of guarding against the plague by inoculating with its own poison promises still less success, because it is very common to see people who have been cured of it ten times die on the eleventh.

"Shall I give you, sir, an instance of the whimsicalness of this disease? The Imans practice charity with the most religious zeal. We observe some of them who, after having washed, rubbed and buried thousands of those whom the plague has killed, without experiencing the smallest inconvenience, are attacked and overwhelmed at times when they are least exposed to the supposed exciting cause. My opinion, therefore, is that in the present state of our knowledge, the best thing we can do in this respect is to establish hospitals, over which men of your merit cannot be too vigilant for the purpose of recommending proper discipline to governments.[*]

"I have the honor to be, etc., CONSTANTIN YPSILANDY."

Dr. Jenner proposed vaccination in hydrophobia. Thus in a letter to Rev. Dr. Worthington, dated London, Flading's Hotel, Oxford street, June 26, 1811, he says:

"Yesterday I dined with Professor Davy. I wish you had been with us. His mind is all in a blaze. He seems to be one of those rare productions which nature allows us to see in a score of centuries. We touched on hydrophobia. He started an ingenius idea, that of counteracting the effect of one morbid poison with another. What think you of a viper?

"Not its broth, but its fang, as soon as the first symptom of disease appears from *Casination*. If this should succeed we must domiciliate vipers as we have leeches. But from this hint I should be disposed to try, under such an event, vaccination; as it can almost always be made to act quickly on the system, whether a person has previously felt its influence or not, or that of the small-pox."

John Archer, M. D., of Hartford county, Maryland, recommended vaccination as a remedy for pertussis, in a letter addressed to Dr. Samuel Latham Mitchell, of New York, dated November 15, 1808.

Dr. Archer stated that he had "vaccinated six or eight patients that had the whooping-cough, and in every case it succeeded in curing this most troublesome disease."

"The whooping-cough does not come to its height in less than six weeks from its commencement, and then, when a favorable termination is expected, the declension of the disease is gradual and it does not terminate in less than six weeks more. To arrest this afflicting disorder in its progress, I would recommend vaccination in the second or third week of the whooping-cough. The termination of the vaccine disease will be the termination of the whooping-cough; that is, as soon as the vaccinated part loses the efflorescence, and the scab begins to dry and becomes of a blueish or brownish color, there will then be an evident change in the whooping-cough for the better, and the severe symptoms will cease.—*Medical Repository. Vol.* 4. *New York*, 1809; *p.* 182.

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[*] The Medical Repository and Review of American Publications on Medicine, Surgery and the Auxiliary Branches of Science. Conducted by Samuel Latham Mitchell, M. D., and Edward Miller, M. D. Vol. 3. New York, 1806; pp. 427-429.

"It was even reported that vaccination was an effectual bar against the syphilis. With reference to this supposed power of the vaccine virus, a writer in the Medical Repository, in the year 1805 (vol. 2, p. 76), remarks: 'Of this power we nave heard no proof, and as far as our observations extend, the old enemy of the gentlemen of gallantry harasses them as sorely as ever. Should they be able to take shelter behind the vaccine, it would be a protection to which they might gladly betake themselves.'"

It was also claimed in the early part of the nineteenth century,* even before 1805, that the *rot in sheep* could likewise be prevented by vaccination. Experiments, however, demonstrated that the cow-pox was powerless to preserve these animals from that distemper. Dr. De Carro testified that this operation, which was called clavelization, was quite fashionable in some parts of Germany, but that there were no facts to prove that the experiments had prevented *rot in sheep.* The expectations entertained of vaccination preventing hydrophobia in dogs were equally fallacious.

SPURIOUS VACCINATION, OR THE ABNORMAL PHENOMENA ACCOMPANYING AND FOLLOWING VACCINATION, EXCITED THE ATTENTION OF THE MEDICAL PROFESSION OF ENGLAND IN THE EARLIEST PERIOD OF THE HISTORY OF VACCINATION.

It has been shown by the preceding works of Edward Jenner, Pearson and Woodville that the phenomena of cow-pox and vaccination were critically studied, and the causes of deviation in the progress and effects of the disease carefully noted.

The enemies of vaccination seized with avidity upon all facts which tended to weaken the confidence of the profession and public, and to excite prejudice against the measure proposed by Dr. Jenner for the eradication of small-pox.

Drs. Wm. Rowley, B. Moseley and R. Squirrel (John Gale Jones) not only published works against vaccination, but circulated prints representing the human visage in the act of transformation and assuming that of a cow. Dr. William Rowley exhibited in all the touching simplicity of graphic delineation a *Master Jowles, the cow-poxed, ox-cheeked* young gentleman, and the Miss Mary Ann Lewis the *cow-poxed and cow-manged* young lady.

The articles of this celebrated triumvonate—Moseley, Rowley and Squirrel—appeared in the columns of the *Independent Whig* and of the *Medical Observer*, and also as separate treaties.

I have in my possession a translation in French of the books of Rowley, Moseley and Squirrel, entitled as follows:

La vaccine combattue dans le Pays ou elle a pris naissance, ou traduction de Trois ouvrages Anglais; Savori.

1. *De l'inefficacité et des dangers de la vaccine; ouvrage, dans lequel sont, rapportes plus de cinq cents accidents; suivi d'un Mode de Traitement pour les Maladies causées par la vaccine, Traduit sur la troisiéme edition de docteur Wiliam Rowley, auteur de la Médecine Universelle, Membre de l'Universitivé d'Oxford, du College Royal de Médicine, et professeur,* etc.

2. Discussion Historique et critique sur la vaccine, par le Docteur Moseley, Médicin de l'Hôspital Militaire de Chelsea, membre de Collège de Médecine de Londres, auteur d' un traité sur les Maladies tropiques des Rapports faits au comité de la Chambre des Communes, par plusieurs Medécins et Chirurgiens, concernant la vaccine.

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*The Medical Repository, vol. 2; New York, 1805; pp. 75-76.

3. Observations sur l'Inoculation variolique tendant, à prouver qu'elle est plus salutaire pour le genre humain que la vaccination; par R. Squirrel, docteur en Médecin, ancien pharmacien à l'Hôspital de la petite verole et d'inoculation.

Aux Deux Gravures Coloricés. A Paris, Chez Gignet et Michaud, Imprim.; Libraires, Rue des Bons-Enfants, No. 34, 1807.

The work of Dr. William Rowley is illustrated by 504 examples or cases of "the accidents occasioned by vaccination."

Dr. Moseley, physician to Chelsea Hospital, first made his attack upon the cow-pox in a treatise on sugar; and his bitterness and prejudice claimed to see in distant prospects, an awful aggravation of human ills, from an admixture of bestial humours, which the *cow mania* as he elegantly termed it threatened to inflict upon the human race. He even predicted an alteration in "the human form divine," and that another brood of minotuars would overspread the land "Semibovemque virum Semiviriemque borum."

This attack of Dr. Moseley on vaccination brought out many champions, on the side of Dr. Jenner, prominent amongst whom was Mr. John Ring.

At first Mr. Ring's opinion on vaccination had been somewhat modified by the publications of Drs. Pearson and Woodville; but when Dr. Jenner's accurate details were confirmed and illustrated by his own experience, he devoted a great part of his professional life to the cause of vaccination. Mr. Ring investigated every adverse case that he heard of in London; he offered gratuitous vaccination to all who would accept of it; and he marshalled the chief medical men in London, who had satisfied themselves of its efficacy, by procuring their signatures to the following testimony.

> "Many unfounded reports have been circulated, which have a tendency to prejudice the public against inoculation for the cow-pox. We, the undersigned, physicians and surgeons, think it our duty to declare an opinion that those persons who have had the cow-pox are perfectly secure from the future infection of the small-pox. We also declare that the inoculated cow-pox is a much milder and safer disease than the inoculated small-pox."

This document bears the signature of thirty-three of the most eminent physicians, and of forty distinguished surgeons of the London College of Surgery, amongst whom are the well-known names of Baille Vaughn (afterwards Sir Henry Halford), Cline, Cooper, Abernethy, Lettsom, Willan, Garthshere, Maton, Lynn, Blair, Dundas, Good, John Pearson, James Moore, Saunders, Croft, Garnett, etc., etc.

Dr. Jenner, in a letter to R. Dpnning. Esq., dated Berkley, February 10, 1805, thus alludes to the subsequent publication of Dr. Moseley:

> "Have you seen Moseley's infamous pamphlet? You ask for fatal cases of the vaccine. This gentlemen, in one single paragraph, furnishes you with some of the most terrible deaths that were ever heard of from this cause. One would suppose he was speaking of the small-pox, as he tells us the children did not lose their torments even in the article of death! Luckily, he takes away every thing like truth that can attach to this history by omitting every kind of reference. What punishment does a man of this description merit?"

In a letter addressed to R. Dunning, Esq., dated Cheltenham, February 21, 1806, he thus characterizes the injurious effects of the statements of Rowley, Moseley and Squirrel:

> "What havoc the anti-vaccinationists have made in town by the reintroduction of variolous inoculation! It is computed that since April last, not less than 6,000 persons in the metropolis, and the villages immediately in contact, have fallen victims to the small-pox. One would scarcely conceive it possible; but these murders are, for the most part, to be attributed to the absurd productions of Moseley, Rowley, and that port little Squirrel, to say nothing of Goldson.
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> It is about London that the venom of these deadly serpents chiefly flows. So little have the people around me (though only 100 miles from it) felt it, that since August last I have vaccinated within a few of 1500; and I must certainly deem it a piece of extreme good fortune that out of the many thousands I have vaccinated, no failure or accident

of any sort has arisen to my knowledge." "Did you see a paper in the last Journal from a Dr. Wood? I think it capable of doing great mischief, as it will tend to make practitioners careless about a point of great consequence, namely, an herpetic state of the skin, coincident with vaccination, which you as well as myself, have not only observed, but publicly and very properly noticed. My communications from various parts of the world are very cheering—800,000 cases from India."

Dr. Jenner, in connection with the subject of the interference of herpes with the vaccine pustules, again refers to Dr. Moseley, in a letter to R. Dunning, Esq., dated Berkley, April 22, 1806:

"The impertinent interference of herpes with our vaccine pustules, I thought of so much consequence to be generally known, as to induce me to reprint my paper on the subject for distribution. With this you will receive two copies; one of which I must beg your acceptance of; and the other you will have the kindness to present to the Dock Jennerian Society, with my grateful respects to the members. You will do much public good by enforcing attention to the progress of the vaccine pustule. If it be torn to pieces, either by the nails or the lancet, before the business for which it was placed upon the arm was accomplished, it is unreasonable to suppose that perfect security can follow. But to what purpose shall you or I address the public on these subjects, while such unprincipled characters as Moseley, and those who enlist under his banner, still continue to instil, or rather to push by violence, into the minds of the British nation their doctrines? Have you seen Moseley's last pamphlet, the one just published? It is far more violent than any of the preceding. In this he has brought forward a string of cases to point out my failures in vaccination—cases of small-pox after cow-pox. But mark his audacity. They are of children I never saw in my life, and whose names I never heard of till they were placed before me in the murderons publication. Mr. H. Jenner, whose name he brings forward with a list of failures annexed, assures me that *the whole* is a most impudent forgery. What can be done with such a man as this? A general manifesto with the signatures of men of eminence in the profession (and I really think we should now embrace nearly, if not quite, the whole), in favor of vaccination, would, if anything could, crush the hissing heads of such serpents at once; and I fear nothing short of it, unless Parliament had a mind again to take the matter up."

From the preceding extracts it is evident that Dr. Jenner has made a careful study of the effect of skin diseases upon the progress of the vaccine vesicles; and we find him thus alluding to the same subject in a letter dated Berkley, February the tenth, 1805.

"In the cicatrix of those children on whose arms, through the intervention of herpes, the pustule has proceeded irregularly, I find in general a singular deviation, which it will be difficult to describe by words and I draw most wretchedly. Instead of the flat, correct indentation, the cicatrix exhibits a preceptible elevation of a conical shape, though very slightly so. I have a fine specimen in a child lately inoculated, with recent tinea capiles, and shall endeavor to take a cast in wax or Paris plaster. Indeed a series of pustules might be done in this way, and afterwards colored."

The important suggestion of Dr. Jenner, with reference to casts, andillustrations of the vaccine cicatrix was fulfilled in an able manner by J. E. B. Denarp Decanteleu in his Monographie des cicatrices de la vaccine, published at Paris in 1851.

Dr. Denarp Decanteleu published a large lithographic drawing, copied from a collection of casts in stucco, taken from the arms of a large number of subjects, this collection of casts of vaccine scars, colored after nature, the author refers to in the single number of his unfinished Monograph, and offered them for the inspection of his readers as corroborativeof the accuracy of his drawing*.

Dr. Jenner held that the herpetic affections affected the progress of variolous inoculation, as well as that of the cow-pox. His views are thus stated in a letter to James Moore, Esq., dated Berkley, February 26, 1810:

"Do you not intend mentioning cases of small-pox after supposed security from small-pox inoculation? Such cases are innumerable. I think there are thirteen on record among the families of the nobility. Blair, I believe, has collected the greatest number

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*Dr. Henry Austin Martin of Boston purchased, from the publisher, Balliere of Paris, all that remained of the edition of this work; and I am indebted to the courtesy and generosity of Dr. Martin for a copy of *this valuable contribution* to the history of vaccination.

of them. You know my old opinion of the matter; that they occur, for the most part, through the interference of herpetic affections at the time of inoculation. One decisive proof you will find in Willan's Vaccine Book, given by me. From facts I go to hypothesis; and conceive that the appearance of the small-pox twice in the same individual arises from the same cause?

"On this subject I could write a long chapter; but as it would necessarily be theoretical, you would not thank me for it. I must just touch upon it. We see that variolous matter may be generated by inoculation on the arms of one person in that degree of perfection as to communicate the small-pox by transferring it to those of another; yet the person whose constitution shall in the first instance have been exposed to it, shall remain unprotected from future infection, although the system has been deranged during its presence on the skin. Where, then, is the difference, whether the morbid poison was confined or limited to a point or two, or spread universally in the form of pustules. If the change required to give security could not take place in this one instance, why should it in another under the same existing circumstances? The *peculiarity of the action* (I do not like to call it *morbid*, because it is generally salutary), is often too strong to be overcome, yet I am ready to conclude that this is not a frequent occurrence.

"The more I reason upon it, the more I am convinced that the idea I broached in my first publication on the cow-pox, namely: that poisonous animal fluids are not absorbed and carried into the blood vessels is correct."

In the same letter to Mr. Moore, Dr. Jenner thus exposes and disposes of his enemy, the notorious "*Squirrel:*"

"John Gale Jones, I see, has at length succeeded in obtaining the situation for which he has long been a candidate. This fellow had once the impudence to desire a man to call on me in Bedford Place, to say, that he, Jones, would advise me immediately to quit London, for there was no knowing what an outraged populace might do. He was the writer of Squirrel's book, the long anti-vaccine columns in the *Independent Whig*, and many of the most violent papers in the *Medical Observer*. I was held up in his Forum for several nights as an object of derision; but I silenced him by the same weapon as I had many others—contempt."

RESEARCHES UPON "SPURIOUS VACCINATION," OR THE ABNORMAL PHENOMENA ACCOMPANYING AND FOLLOWING VACCINATION IN THE CONFEDERATE ARMY, DURING THE RECENT AMERICAN CIVIL WAR, 1861-1865.

SECTION 1.–PRELIMINARY OBSERVATIONS–ACCIDENTS ATTENDING VACCINATION AMONGST THE CITIZENS AND SOLDIERS OF THE CONFEDERATE STATES–NECESSITY FOR THE INVESTIGATION–METHOD, EXTENT AND OBJECT OF THE INQUIRY–THE INJURIOUS EFFECTS OF VACCINATION REFERRED TO SIX CAUSES–CIRCULAR LETTER ADDRESSED TO THE MEDICAL OFFICERS OF THE LATE CONFEDERATE ARMY–FACTS ILLUSTRATING THE VALUE OF VACCINATION AND THE FATALITY OF SMALL-POX–DESCRIPTION OF SMALL-POX BY SIR MATTHEW HALE–DR. JENNER POINTED OUT SOME CAUSES OF THE ACCIDENTS ATTENDING VACCINATION AND GAVE RULES FOR THEIR AVOIDANCE.

During the recent civil war, untoward results followed vaccination, and a number of deaths both amongst the troops and citizens were directly referable to the effects of vaccination. So great was the evil in the army, that it was made a special subject of investigation, and a number of interesting reports were prepared by several of the medical officers, upon what was most generally called in the army, "spurious vaccination." Our friend, Surgeon Jackson Chambliss, in charge of Div. No. 1, Camp Winder Hospital, Richmond, had examined and recorded a large number of cases of "spurious vaccination," illustrated with drawings of the various local diseases and skin affections. As far as our information extends, this valuable mass of matter, relating to one of the most important subjects in its bearings upon the welfare of the human race, was destroyed during the evacuation of Richmond.

So common had accidents become after vaccination, and so strong was the prejudice growing, both in the army and amongst citizens against its employment, that we instituted a series of experiments upon the inoculation of cows with small-pox matter, in order to produce, if possible, cow-pox, from whence a supply of fresh and reliable vaccine matter might be obtained. It was our design to carry out an extensive series of investigations upon the various secondary affections following vaccination, and to determine, if possible, what contagious principles could be associated with the lymph of the vaccine vesicle. These labors were brought to a sudden and unexpected close, by the disastrous termination of the civil war. As far, however, as our labors amongst the Confederate troops extended, we were led to attribute the injurious effects of vaccination to the following causes:

1ST.—*Depressed forces, consequent upon fatigue and exposure and poor diet; impoverished, vitiated and scorbutic condition of the blood of the patients vaccinated, or yielding vaccine matter.*

2D.—*The employment of matter from pustules or ulcers which had deviated from the regular and usual course of development of the vaccine vesicle; such deviation or imperfection in the vaccine disease or pustule being due mainly to previous vaccination, and the existence of some eruptive disease at the time of vaccination. Or, in other words, the employment of matter from patients who had been previously vaccinated, and who were effected with some skin disease at the time of the insertion of the vaccine virus.*

3D.—*Dried Vaccine, Lymph or Scabs, in which decomposition has been excited by carrying the matter about the person for a length of time, and thus subjecting it to a warm, moist atmosphere.*

4TH—*The mingling of the Vaccine Virus with that of the Small-Pox—matter taken from those who were vaccinated while they were laboring under the action of the poison of Small-Pox, was capable of producing a modified Variola, and comparatively mild disease in the inoculated, and was capable of communicating by effluvia Small-Pox in its worst character to the unprotected.*

5TH.—*Dried Vaccine, Lymyh or Scabs, from patients who have suffered with Erysipelas during the progress of the Vaccine Disease, or whose systems were in a depressed state from improper diet, bad ventilation, and the exhalations from Typhoid Fever, Erysipelas, Hospital Gangrene. Pyœmia, and offensive suppurating wounds.*

6TH—*Fresh and dried Vaccine Lymph and Scabs, from patients suffering from Syphilis, at the time, and during the progress of vaccination and the vaccine disease.*

I addressed a large number of communications relating to "*Spurious vaccination*," to Southern physicians formerly connected with the *Confederate Army*, and the replies to these inquiries will be found in the following pages.

The following is the general form of circular employed:

———————— ——18—

————————, M. D.

Dear Sir—

* * * * * * * * * * * *

In the circumscribed and distressed condition of the Southern States, cut off from the surrounding world, with the necessity of Vaccinating the entire male population capable of bearing arms, and without any means of obtaining fresh and reliable matter outside of the Confederate States, the experience of the Medical Officers of the Confederate Army possesses a high and peculiar value.

I shall be glad to receive from you a communication, setting forth your views at length upon the nature and value of Modified Inoculation, and *upon the* NATURE *and* CAUSES *of the* ACCIDENTS *resulting from* VACCINATION ("SPURIOUS VACCINATION") *in the Confederate Army.*

The subject of the TRANSMISSION *of* SYPHILIS *through the medium of the* VACCINE VIRUS, should be carefully discussed, and all conclusions should be supported by carefully recorded *facts* and *cases*. *One* well reported *case*, proving the transmission of *Constitutional Syphilis*, or any other disease, as *Erysipelas*, by vaccination, is worth large volumes of mere opinions and assertions.

We should exercise the utmost caution in discussing the value of vaccination, and the causes of the accidents, which have tended of late, to bring it into disrepute with the public; for all conscientious physicians and lovers of mankind will agree that this question is interesting, not only to the physiologist and medical practitioner, but that it concerns every community on the earth, and comes home to every individual of the human race.

It has been well said, by a writer who was not a medical man, "It is difficult to conceive that there should be one being who would not be affected by its decision, either in his own person, or by those of his nearest connexions. To the bulk of mankind wars and revolutions are things of infinitely less importance; and even to those who busy themselves in the tumult of public affairs, it may be doubted whether anything can occur that will command so powerful and permanent an interest, since there are few to whom fame or freedom can be so intimately and constantly precious as personal safety and domestic affection."

It is important that we should carefully distinguish the accidents which result from the carelessness in the selection of the matter, and from ignorance of the true character and progress of the vaccine disease.

You will oblige me by answering at an early day, and also by forwarding the address of any physicians who have made this subject a special study, and who have recorded trustworthy observations. Very respectfully yours, JOSEPH JONES.

This circular letter was not as widely distributed as desired; as it has been difficult to ascertain the address of many of the medical officers of the Southern Army, on account of the sudden manner in which the struggle terminated, and the utter and sudden loss of all organization and records, and on account of the imperfect mail facilities of the Southern States.

The replies which have been received in response to my letters, will be found under the different divisions of the inquiry; and we have preferred presenting each paper entire, when using it for the illustration of some particular branch of the subject, although it might contain some matter irrelevant to the subject under immediate consideration. In this manner we hoped to do justice to those contributing facts and observations; and whilst we have freely expressed the results of our investigation, and given our judgment without reserve, we have endeavored, on the other hand, to avoid all personal criticism.

Before proceeding to the discussion of the subjects under consideration, it is but just that I should disclaim all designs of decrying vaccination when properly performed. Nothing is farther from my intention, than even in the remotest manner, to detract from the value of the greatest physical boon ever bestowed by a mortal upon the human race.

From authentic documents and accurate calculations, it has been ascertained that *one* in fourteen, of all that were born, died of the small-pox, even after inoculation had been introduced; and of persons of all ages taken ill of the small-pox in the natural way, one in five or six died; and in addition to this frightful mortality, alike observable in all the different regions of the globe, many of those who recovered were permanently disfigured, or deprived of eyesight, or left with shattered constitutions the prey to pulmonary consumption, chronic opthalmia, and scrofula.

According to the researches of Black, Lüssmileh and Frank, eight or nine per cent. of the human race were carried off by small-pox: and Duvillard endeavored to show that of 100 persons, only four reached the age of thirty years without having it; that one in seven or eight, who were affected, died; and that of those who were attacked in infancy only two-thirds escaped. Before the introduction of vaccination, small-pox was infinitely more destructive to human life than the plague itself; it has swept away whole tribes of savage and half civilized people, and its miserable victims have been abandoned by their nearest relatives and friends, as persons doomed by divine wrath to irrevocable death; it was calculated that 210,000 fell victims to it annually in Europe, and Bernouilli believed that not less than fifteen millions of human beings were destroyed by small-pox every twenty-five years, that is six hundred thousand annually; and this loathsome disease was not only universal in its ravages, but was so subtle in its influence and insidious in its attack, that all efforts to stay its violence or to prevent its approach, were utterly futile. Even inoculation whilst it was far less fatal than the natural small-pox and thus benefited the individual, tended nevertheless to increase the spread of the disease, and its extensive adoption was attended with a most marked increase of mortality of the disease in the human race.

Sir Matthew Hale, in a letter of advice and admonition to one of his grandsons, has given an excellent picture of this disease, which well illustrates its odious characters, and exhibits the impression which it makes on the world at large, in a stronger light than if the description had been drawn up by a strictly professional hand.

"First, therefore, touching your late sickness (small-pox) I would have you remember these particulars: 1st. The disease itself in its own nature is now become ordinarily very mortal, especially to those of your age. Look upon even the last year's general bill of mortality, you will find near two thousand dead of that disease; and, had God not been merciful to you, you might have been one of that number with as great likelihood as any of them who died of that disease. 2d. It was a contagious disease that secluded the access of your nearest relations. 3d. Your sickness surprised you upon a sudden, when you seemed to be in your full strength. 4th. Your sickness rendered you noisome to yourself and all that were about you: and a spectacle full of deformity, by the excess of your disease, beyond most that are sick thereof. 5th. It was a fierce and violent sickness: it did not only take away the common supplies of nature, as digestion, sleep, strength, but it took away your memory, your understanding and the very sense of your condition, or of what might be conducible to your good. All that you could do was only to make your condition more desperate, in case they that were about you had not prevented it and taken more care for you than you did or could for yourself. 6th. Your sickness was desperate, in so much that your symptoms and the violence of your distemper were without example; and you were in the very next degree to absolute rottenness, putrefaction and death itself."

By the unaided efforts of a man, emulous not of distinction but desirous of advancing truth, and promoting the happiness and well being of his fellow creatures, and distinguished as much for his humility, long suffering and perseverance, as for his unsurpassed powers of practical observation, the world has been furnished with the means of completely eradicating this terrible scourge, by substituting the same disease in a mild, modified form non-communicable by effluvia and capable of affording complete immunity from the natural small-pox.

So far, therefore, from charging the accidents which we are about to describe, to the process of vaccination, as established and advocated by Edward Jenner, we are persuaded that a very large part, if not the whole, of these distressing accidents and failures, are to be ascribed directly or indirectly to the ignorance, and inattention of those who practice vaccination. We have no more sympathy with the modern opponents of vaccination, than we have with those English physicians who attempted to decry the labors and to steal the honest dues of their immortal countryman, and who condescended to such low expedients as to caricature the process of vaccination, by representing the human vissage under its effects, in the act of transformation into that of the lower animals, the cow and the horse. And we would heartily endorse any public enactment which would guard in a proper manner the process of vaccination; and at the present time, some of the older European edicts upon the subject of vaccination, as those of the Emperor of Russia in 1811, and of the King of Wirtemburgh in 1818, might be reënacted, by the General and State Governments, with great benefit to the people.

If the profession had uniformly adhered to the advice and the rules established by the illustrious founder of vaccination, we would have been spared the vast majority of the unfortunate accidents which tend to bring this the only safeguard against the small-pox, into disrepute.

Dr. Jenner gave the most minute attention to every deviation from the correct progress of the vaccine vesicle, to the state of the virus to be inserted, to the condition of the skin of the person about to be vaccinated, and to the character of the vesicle itself; and so early as the year 1799, had ascertained by the clearest evidence, some of the causes of accident and failure, which had been confirmed by later observations.

He showed that in some cases the system was not rendered totally unsusceptible to the variolous contagion, either by the cow-pox vaccination or the small-pox; but that vaccination, when properly performed with genuine matter, afforded as complete protection as the small-pox itself. He proved that by inoculating a person who had gone through the cow-pox, with variolous matter, it was possible to excite a local vesication, the virus from which was capable of producing a mild but efficacious small-pox. He farther maintained that modifications and varieties might arise in the vaccine pustule, and that these varieties were such as to produce "every gradation in the state of the pustule, from that slight deviation from perfection, which is quite immaterial, up to that point which affords no security at all." He held that fluid taken from a spurious vaccine pustule can propagate and perpetuate its like, and even if it be taken from a genuine pustule in its far-advanced stages, it is capable of producing varieties which will be permanent if we continue to employ it.

Jenner laid great stress upon the herpetic state of the skin, in inducing deviation in the normal progress of the vaccine disease; but every deviation, from whatever cause it may have arisen, was considered by him of the greatest moment; and in all his published works, as well as in his private communications and letters, he never failed to urge the importance of the most scrupulous attention to the mode of propagation and to the whole progress of the vaccine disease.

Thus in his paper on the "Varieties and Modifications of the Vaccine Pustule," he thus urges upon the profession the necessity of the most careful attention to this important subject:

> "I shall conclude this paper by observing that although vaccine inoculation does not inflict a severe disease, but, on the contrary, produces a mild affection, scarcely meriting the term *disease*, yet, nevertheless, the inoculator should be extremely careful to obtain a just and clear conception of this important branch of medical science. He should not only be acquainted with the laws and agencies of the vaccine virus on the constitution, but with those of the variolous also, as they often interfere with each other.
>
> "A general knowledge of the subject is not sufficient to enable us to warrant a person to practice vaccine inoculation: he should possess a peculiar knowledge; and that which I would wish strongly to inculcate, as the great foundation of the whole, is an intimate acquaintance with the character of the true and genuine pustule. The spurious pustule would then be readily detected, whatever form it might assume; and errors known no more."

Dr. Jenner, in a letter written to Sir Gilbert, near the close of his life, reiterates these precautions, and observes:

> "With regard to the mitigated disease which sometimes follows vaccination, I can positively say, and shall be borne out in my assertion by those who are in future days to follow me, that it is the offspring entirely of incaution in those who conduct the vaccine process. On what does the inexplicable change which guards the constitution from the fang of the small-pox depend? On nothing but a correct state of the pustule on the arm excited by the insertion of the virus; and why are these pustules sometimes incorrect, losing their characteristic shape, and performing their offices partially?"—*Life of Edward Jenner, M. D. etc., by John Baron, M. D.; vol. 2, p.* 241.

Jenner even went so far as to maintain that the process of vaccination might be rendered ineffective by mechanically disturbing the vesicle, during the collection and transmission of the virus, and he insisted upon the necessity of allowing one vesicle at least to run its course undisturbed.

So far, therefore, from desiring to injure the cause of vaccination by the record of distressing failures and accidents, it will be our endeavor, rather in the spirit of Jenner, to guard the process, by so exposing the cause of these accidents as to lead to their avoidance in future.

"Ere I proceed, let me be permitted to observe, that truth in this, and every other physiological inquiry that has occupied my attention, has ever been the first object of my pursuit; and should it appear in the present instance that I have been led into error, fond as I may appear of the offspring of my labors, I had rather see it perish at once than exist and do a public injury."

SECTION II.—MODIFICATION, ALTERATION AND DEGENERATION OF THE VACCINE VESICLE, DEPENDENT UPON DEPRESSED AND DERANGED FORCES, RESULTING FROM FATIGUE, EXPOSURE AND POOR DIET; AND UPON AN IMPOVERISHED, VITIATED AND SCORBUTIC CONDITION OF THE BLOOD OF THE PATIENTS VACCINATED AND YIELDING VACCINE MATTER. IN SCORBUTIC PATIENTS ALL INJURIES OF THE SKIN TEND TO FORM ULCERS OF AN UNHEALTHY CHARACTER. EFFECTS OF SCURVY UPON THE CHARACTER AND PROGRESS OF THE VACCINE VESICLE.—INVESTIGATIONS UPON THE EFFECTS OF VACCINATION AMONGST THE FEDERAL PRISONERS CONFINED IN CAMP SUMPTER, ANDERSONVILLE, GA. EXAMINATION OF THE CHARGE URGED BY THE UNITED STATES MILITARY COMMISSION, THAT THE CONFEDERATE SURGEONS DELIBERATELY POISONED OR DESTROYED THE FEDERAL PRISONERS AT ANDERSONVILLE WITH POISONOUS VACCINE MATTER. DR. HAMILTON ON SPURIOUS VACCINATION IN THE U. S. ARMY. DR. L. GUILD ON THE MEDICAL RECORDS OF THE ARMY OF NORTHERN VIRGINIA. REPORTS ON SPURIOUS VACCINATION IN THE CONFEDERATE ARMY, BY S. E. HABERSHAM, M. D., OF AUGUSTA, GEORGIA, AND OTHER CONFEDERATE OFFICERS.

Large numbers of the Confederate soldiers manifested slight scorbutic symptoms, which were not sufficient to attract attention, or to induce treatment, and as far as we could learn, no attention was paid to this condition either in vaccination or in the selection of the vaccine lymph.

In scorbutic patients, all injuries tended to form ulcers of an unhealthy character, and the vaccine vesicles even when they appeared at the proper time, and manifested many of the usual symptoms of the vaccine disease, were nevertheless larger and more slow in healing, and the scabs presented an enlarged, scaly, dark, unhealthy appearance. In many cases a large ulcer, covered with a thick laminated crust, from one-quarter to one inch in diameter, followed the introduction of the vaccine matter into scorbutic patients. Matter from these scabs and sores was frequently used in vaccination, and this decomposing pus and blood acted as an animal poison in some cases, and especially in constitutions debilitated by exposure, fatigue and salt diet.

During the prosecution of the investigations which we instituted upon the diseases of the Federal prisoners confined at Andersonville, the opportunity was embraced of investigating the remarkable effects which followed the attempts of the Confederate medical officers to arrest the spread of small-pox by vaccination. In a number of cases large gangrenous ulcers appeared at the points where the vaccine lymph had been inserted, causing *extensive* destruction of tissues, exposing arteries, nerves and bones, and necessitating amputation in more than one instance. These accidents led to the belief amongst some of the prisoners that the surgeons had intentionally introduced poisonous matter into their arms during vaccination·

After careful inquiry we were led to the conclusion that these accidents were, in the case of these Federal prisoners, referable wholly to the scorbutic condition of their blood, and to the crowded condition of the stockade and hospital. The smallest accidental injuries and abrasions of the surface, as from splinters, or bites of insects, were in a number of instances followed by such extensive gangrene as to necessitate amputation. The gangrene following vaccination appeared to be due essentially to the same cause; and in the condition of the blood of these patients, would most probably have attacked any puncture made by a lancet, without any vaccine matter or any other extraneous material. It appeared also that the dried scab, resulting from the vaccination of these scorbutic patients, was also capable of producing effects wholly different from the vaccine lymph of healthy individuals; and in some cases these effects were of a most potent and injurious character.

The cause of JUSTICE and TRUTH demands, at my hands, something more than this simple record, with reference to the *accidents* following *vaccination* amongst the Federal prisoners confined in Camp Sumpter.

In the specification of the first charge against Henry Wirz, formerly Commandant of the interior of the Confederate States Military Prison, during his *Trial* before a *Special Military Commission*, convened in accordance with Special Orders No. 453, War Department, Adjutant General's Office, Washington, August 23, 1865, the following is written:

> "And the said Wirz, still pursuing his wicked purpose, and still aiding in carrying out said conspiracy, did use and cause to be used, for the pretended purpose of vaccination, impure and poisonous matter, which said impure and poisonous matter was then and there, by the direction and order of said Wirz, maliciously, cruelly, and wickedly deposited in the arms of said prisoners, by reason of which large numbers of them, to-wit, one hundred, lost the use of their arms, and many of them, about the number of two hundred, were so injured that they soon thereafter died: All of which he, the said Henry Wirz, well knew and maliciously intended, and in aid of the then existing rebellion against the United States, with the view to assist in weakening and impairing the armies of the United States, and in furtherance of said conspiracy, and with full knowledge, consent and connivance of his co-conspirators aforesaid, he, the said Wirz, then and there did."

Amongst the co-conspirators specified in the charges, were the Surgeon of the Post, Dr. White, and the Surgeon in charge of the Military Prison Hospital, R. R. Stevenson. As ths vaccinations were made by their orders, and by the medical officers of the Confederate Army, acting under their command, the charge of deliberately poisoning the Federal prisoners with vaccine matter was a sweeping one, and whether intended so or not, affects every medical officer stationed at that post; and it appears to have been designed to go farther and affect the reputation of every one who held a commission in the Medical Department of the Confederate Army.

The acts of those who once composed the Medical Department of the Confederate Army, from the efficient and laborious Surgeon General to the Regimental officers, need no defence at my hands; time, with its unerring lines of historic truth, will embalm their heroic labors in the cause of suffering humanity, and will acknowledge their untiring efforts to ameliorate the most gigantic mass of suffering, that ever fell to the lot of a beleagnered and distressed people.

I desire at the present time, simply to place on record, the results of labors which concern this country, no more than any other; and the results when properly received without prejudice or malicious hatred, will be seen to relate to the hygiene and to the diseases of prisoners, however confined, and wherever incarcerated, in civil or military prisons throughout the world.

In accordance with the direction of Dr. Samuel Preston Moore, formerly Surgeon General C. S. A., I instituted during the months of August and September, 1864, a series of investigations upon the diseases of Federal prisoners confined in Camp Sumpter, Andersonville, Georgia.

The field was of great extent and of extraordinary importance. There were more than five thousand seriously sick in the hospital and stockade, and the deaths ranged from ninety, to one hundred and thirty, each day. From the establishment of the prison, on the twenty-fourth day of February, 1864, to the first of October over ten thousand Federal prisoners died; that is, near one-third of the entire number perished in less than seven months. I instituted careful investigations into the condition of the sick and well, and performed numerous post-mortem examinations, and executed drawings of the diseased structures. The medical topography of Andersonville and of the surrounding country was examined, and the waters of the streams, springs and wells, around and within the stockade and hospital carefully analyzed.

The report which I drew up for the use of the Medical Department of the Confederate Army, contained a truthful representation of the sufferings of these prisoners, and at the same time gave an equally truthful view of the difficulties under which the medical officers labored, and of the distressed and beleaguered and desolated condition of the Southern States. Shortly after the close of the civil war, this report, which had never been delivered, on account of the destruction of all railroad communication with Richmond, Virginia, was suddenly seized by the agents of the United States government, conducting the trial to which we have alluded.*

It was with extreme pain that I contemplated the diversion of my labors in the cause of medical science, from their true and legitimate object, and I addressed an earest appeal, which accompanied the report, to the Judge Advocate, Colonel N. P. Chipman, in which I used the following language:

> In justice to myself, as well as to those most nearly connected with this investigation, I would respectfully call the attention of Colonel Chipman, Judge Advocate U. S. A., to the fact that the matter which is surrendered in obedience to the demands of a power from which there is no appeal, was prepared solely for the consideration of the Surgeon General, C. S. A., and was designed to promote the cause of humanity, and to advance the interests of the medical profession. This being granted, I feel assurred that the Judge Advocate will appreciate the deep pain which the anticipation gives me that these labors may be diverted from the original mission, and applied to the prosecution of criminal cases. The same principle which led me to endeavor to deal humanely and justly by these suffering prisoners, and to make a truthful representaion of their condition to the Medical Department of the Confederate Army, now actuates me in recording my belief that as far as my knowledge extends, there was no deliberate or willful design on the part of the Chief Executive, Jefferson Davis, and the highest authorities of the Confederate Government to injure the health and destroy the lives of these Federal prisoners.
>
> On the twenty-first of May, 1861, it was enacted by the "Congress of the Confederate States of America," "That all prisoners of war taken, whether on land or at sea, during the pending hostilities with the United States, should be transferred by the captors, from time to time, as often as convenient, to the Department of War; and it shall be the duty of the Secretary of War, with the approval of the President, to issue such instructions to the Quartermaster General and his subordinates, as shall provide for the safe custody and sustenance of prisoners of war; and the rations furnished prisoners of war shall be the same in quantity and quality as those furnished enlisted men in the army of the Confederacy." By act of February 17, 1864, the Quartermaster General was relieved of this duty, and the Commissary General of Subsistence was ordered to provide for the sustenance of prisoners of war.

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*I have since learned that the United States authorities gained knowledge of the fact that I had inspected Andersonville through information furnished by a distinguished member of the medical profession of the *North, who, after* the close of the war, had shared the hospitality of my own home.

> According to General Orders No. 159, Adjutant and Inspector's General's Office, "hospitals for prisoners of war are placed on the same footing as other Confederate States hospitals, in all respects, and will be managed accordingly."
>
> The Federal prisoners were removed to Southwestern Georgia in the early part of 1864, not only to secure a confinement more remote than Richmond and other large towns, from the operations of the United States forces, *but also to secure a more abundant and easy supply of food.*
>
> As far as my experience extends, no person who had been reared upon wheat bread, and who was held in captivity for any length of time, could retain his health and escape either scurvy or diarrhœa, if confined to the Confederate ration (issued to the soldier in the field and hospital) of unbolted corn meal and bacon. The large armies of the Confederacy suffered more than once from scurvy, and as the war progressed, secondary hemorrhage and hospital gangrene became fearfully prevalent, from the deteriorated condition of the systems of the troops, dependent upon the prolonged use of salt meat. And but for the extra supplies received from home and from the various benevolent institutions, scurvy and diarrhœa and dysentery would have been still farther prevalent."
>
> It was believed by the citizens of the Southern States, that the Confederate authorities desired to effect a continuous and speedy exchange of prisoners of war in their hands, on the ground that the retention of these soldiers in captivity was a great calamity, not only entailing heavy expenditure of the scanity means of subsistence, already insufficient to support their suffering, half-starved, half-clad and unpaid armies, struggling in the field with overwhelming numbers, and embarrassing their imperfect and dilapidated lines of communication; but also as depriving them of the services of a veteran army fully equal to one-third the numbers actively engaged in the field; and the history of subsequent events have shown that the retention in captivity of the Confederate prisoners was one of the efficient causes of the final and complete overthrown of the Confederate Government. * * *
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> It is my honest belief that if the exhausted condition of the Confederate Government, with its bankrupt currency, with its retreating and constantly dimishing armies, with the apparent impossibility of filling up the vacancies by death and desertion and sickness, and of gathering a guard of reserve of sufficient strength to allow of the proper enlargement of the Military Prison, and with a country torn and bleeding along all its borders with its starving women and children and old men fleeing from the desolating march of contending armies, crowding the dilapidated and over-burdened railroad lines, and adding to the distress and consuming the poor charities of those in the interior, who were harrassed by the loss of sons and brothers and husbands, and by the fearful visons of starvation and undefined misery, could be fully realized, much of the suffering of the Federal prisoners would be attributed to causes connected with the distressed condition of the Southern States.

The grand object of the trial and conviction of Henry Wirz was the conviction and execution of President Davis, Gen. Robert E. Lee and other prominent men of the Confederacy, in order that "TREASON MIGHT BE RENDERED FOREVER ODIOUS AND INFAMOUS."

The Judge Advocate, N. P. Chipman, Colonel U. S. A., was not only deaf to this appeal, but in his final argument before "*The Military Commission,*" or so-called "*Court,*" whilst excluding all portions of my testimony which related to the distressed condition of the Southern States, and the efforts of the medical officers and Confederate authorities to relieve the sufferings of the prisoners of war, deliberately endeavored to arouse the hatred of the entire North against the author of the report and the medical officers of the Confederate army.

This statement will be sustained by the following quotation, which I extract from the "*argument*" of the Judge Advocate before the "*Court:*"

> "He had called into his counsels an eminent medical gentleman, of high attainments in his profession, and of loyalty to the rebel Government unquestioned. Amid all the details in this terrible tragedy, there seems to me none more heartless, wanton and void of humanity than that revealed by the Surgeon General, to which I am about to refer. I quote now from the report of this same Dr. Joseph Jones, which he says (Record, p. 4384,) was made in the interest of the Confederate Government, for the use of the Medical Department, in the view that no eye would ever see it but that of the Surgeon General.
>
> "After a brief introduction to his report, and to show under what authority it was made, he quotes a letter from the Surgeon General, dated 'Surgeon General's Office, Richmond, Virginia, August 6, 1864.' The letter is addressed to Surgeon J. H. White, in charge of the hospital for Federal prisoners, Andersonville, Georgia, and is as follows:

"*Sir*—The field of pathological investigation, afforded by the large collection of Federal prisoners in Georgia, is of great extent and importance, and it is believed that results of value to the profession may be obtained by careful examination of the effects of disease upon a large body of men, subjected to a decided change of climate, and the circumstances peculiar to prison life. The surgeon in charge of the hospital for Federal prisoners, together with his assistants, will afford every facility to Surgeon Joseph Jones in the prosecution of the labors ordered by the Surgeon General. The medical officers will assist in such post mortems as Dr. Joseph Jones may indicate, in order that this great field for pathological investigation may be explored for the benefit of the Medical Department of the Confederate States. S. P. MOORE, Surgeon General.

"Pursuant to his orders Dr. Jones, as he tells us, proceeded to Andersonville, and on September 17 received the following pass:

'ANDERSONVILLE, September 17, 1864.

'To Captain H. Wirz, Commanding Prison:

'*Captain*—You will permit Surgeon Joseph Jones, who has orders from the Surgeon General, to visit the sick within the stockade that are under medical treatment. Surgeon Jones is ordered to make certain investigations, which may prove useful to his profession. Very respectfully,

'By order of Gen. Winder: W. S. WINDER, A. A. G.'

"When we remember that the Surgeon General had been apprised of the wants of that prison, and that he had overlooked the real necessities of the prison, shifting the responsibility upon Dr. White, whom he must have known was totally incompetent, it is hard to conceive with what devilish malice, or criminal devotion to his profession, or reckless disregard of the high duties imposed upon him—I scarcely know which—he could sit down and deliberately pen such a letter of instructions as that given Dr Jones.

"Was it not enough to have cruelly starved and murdered our soldiers? Was it not enough to have sought to wipe out their very memories by burying them in nameless graves? Was it not enough to have instituted a system of medical treatment the very embodiment of charlatism? Was it not enough without adding to the many other diabolical motives, which must have governed the perpetrators of these acts, this scientific object, as deliberate and cold-blooded as one can conceive? The Surgeon General could quiet his conscience, when the matter was laid before him by Colonel Chandler, by indorsing that it was impossible to send medical officers to take the place of the contract physicians on duty at Andersonville, yet could select at the same time a distinguished gentleman of the medical profession and send him to Andersonville, directing the whole force of surgeons there to render him every assistance, leaving their multiplied duties for that purpose. Why? Not to alleviate the sufferings of the prisoners; not to convey to them one ounce more of nutritious food; to make no suggestions for the improvement of their sanitary condition—for no purpose of this kind, but as the letter of instruction itself shows, for no other purpose than that this great field of pathological investigation may be explored for the benefit of the Medical Department of the Confederate Armies."

The denunciations of the Judge Advocate' were leveled, not merely against a defenseless prisoner of war, whose papers had been seized, and himself dragged as a witness to this crucifixion of his native land, but they were sweeping in their character, and were designed to arraign the humanity, honesty and intelligence of the Surgeon General and the entire corps of the medical officers of the Confederate Army.

The charge had the desired effect, and was reiterated even by eminent medical men of the North. Thus the son of the Vice President of the United States, Dr. Augustus C. Hamlin, late Medical Inspector U. S. A., Royal Antiquarian, etc., etc., in his *Martyria or Andersonville Prison*, says:

"Here came a medical officer of the highest rank in the rebel army, and one of the most eminent savans of the South, to study the philosophy and physiology of starvation.

"The notes of that fearful clinic are preserved, and may, some future day, startle the scientific world with their clearness, their candor, their positive evidence of the cause of death. Thus the scalpel silences the arguments and reasonings of sophistry."

A similar statement has been made by Dr. Austin Flint, Jr., in his recen work on the *Physiology of Man.*

It was clearly demonstrated in my report that diarrhœa, dysentery, scurvy, and hospital gangrene were the diseases which caused the extraordinary mortality of Andersonville. And it was still further shown that this mortality was referable, in no appreciable degree, to either the character of the soil, or waters, or the conditions of climate.

The effects of salt meat and farinaceous food, without fresh vegetables, were manifest in the great prevalence of scurvy. The scorbutic condition thus induced modified the course of every disease, poisoned every wound, however slight, and lay at the foundation of those obstinate and exhausting diarrhœas and dysenteries, which swept off thousands of these unfortunate men. By a long and painful investigation of the diseases of these prisoners, supported by numerous post-mortem examinations, I demonstrated conclusively that scurvy induced nine-tenths of the deaths. Not only were the deaths registered as due to unknown causes, to apoplexy, to anasarca, and to debility, directly traceable to scurvy and its effects, and not only was the mortality in small-pox, and pneumonia and typhoid fever, and in all acute diseases more than doubled by the scorbutic taint, but even those all but universal and deadly bowel affections, arose from the same causes, and derived their fatal characters from the same conditions which produced the scurvy.

Scurvy and hospital gangrene frequently exist in the same individual. In such cases, vegetable diet, with vegetable acids, would remove the scorbutic condition without curing the hospital gangrene. It has been well established by the observations of Blane, Trotter and others, that the scorbutic condition of the system, especially in crowded camps, ships, hospitals and beleaguered cities, is most favorable to the origin and spread of foul ulcers and hospital gangrene. In many cases occurring amongst the Federal prisoners at Andersonville, it was difficult to decide at first whether the ulcer was a simple result of the scorbutic state, or of the action of the poison of hospital gangrene. So commonly have these two diseases been combined, that the description of scorbutic ulcers by many authorities, evidently, includes also many of the prominent characteristics of hospital gangrene, as will be seen by a reference to the descriptions of Lind, Trotter, Blane and others.

More than two hundred and fifty years ago, Paré described a condition of things similar to that of Andersonville; at the siege of Rouen, the air was so noxious that no wounds would heal, and the besieged finding that all their wounds became gangrenous, reported that the besiegers had poisoned the balls; the besiegers also seeing none but putrid sores in the camp, believed that the wounds were poisoned, and both within and without the city such was the state of the air, and so putrid were all the wounds, that the surgeons could scarcely look upon the sores, or endure the smell; and if they neglected them for a single day, they found them filled with worms

Woodall, in his *Chirurgeons Mate, or Military and Domestic Surgery*, published in 1639, not only carefully describes scrobutic ulcers, but also lays down rules for their treatment; and Gideon Harvey, twenty-four years later. in his "*Venus Unmasked,*" mentions superficial, profound, simple, inflamed, callous, dry. sanious, purulent, phagedenick, and gangrenous ulcers, as characteristic of scurvy. This last named author derives the name scurvy from "Scorbeck, and that from Scornobocca, or Fowl mouth, (from Scorno a Fowl or shameful thing, and bocca the mouth), for a stinking breath and fowl rotten gums, may still be termed a foul or shameful mouth; they call it also La marcia di bocca, or putrefaction of the mouth."—p.24.

The British seamen, in Lord Anson's voyage, and in fact in all long voyages, before the mode of preventing scurvy was practiced, suffered terribly from scorbutic ulcers.

John Huxham in his Essay on Fevers, in a chapter in which he discourses on the "disordered and putrid state of the blood," observes that the

"Salt and half-rotten provisions of sailors in long voyages, cause such a sharpness and corruption of the humors that they are rendered almost unfit for the common uses of life, producing great weakness, langour, wandering pains and aches, stinking breath, corroded, spongy gums, black, blue, and sallow spots, sordid, dark, livid fungous ulcers, gangrene, etc., etc. Such scorbutics frequently fall into patecheal fevers, bloody dysenteries, hemorrhages, etc. What is mentioned by the Rev. Mr. Walter in Lord Anson's voyage, is very surprising, viz.; that the blood burst from the wounds of some of the scorbutics after they had been cicatrified for twenty or thirty years. I have known many a ship's company set out on a cruise in high health, and yet in two or three months, return vastly sickly, and eaten out with the scurvy, a third part of them half rotten, and utterly unfit for service. About four or five weeks after they had been out, they begin to drop down, one after another, and at length by dozens, till at least scarce half the *compliment* can stand to their duty; particularly I remember some years since, from a squadron under Admiral Martin, we had near 1200 men put on the shore sick at one time, though they went out very healthy and returned in about twelve or thirteen weeks."—p. 47.

Dr. John Hunter, Surgeon of the English Army, in his "Observations on the Diseases of the Army in Jamaica," states that

"Sores and ulcers in the lower extremities, were frequent at all seasons of the year, and in all the different quarters were the soldiers were stationed. They, together with fevers and fluxes, amounted to nineteen-twentieths of the sick received into the hospitals, all other complaints not being more than one-twentieth, if particular times be excepted, when the dry-belly-ache or small-pox were prevalent. The proportion of sores in the hospitals, though always considerable, admitted of great variation. At Spanish Town and Kingston they were often one third; at Fort Augusta, one-half, at Stony Hill, two-thirds of the whole number in hospital. They arise from the most trifling causes; a scratch, or hurt, or bruise in the lower extremities, are sufficient to produce a sore, which is always difficult to heal, and sometimes impossible. Old sores often break out anew, and prove equally obstinate."

Dr. Lind, in his valuable work on scurvy, has recorded the fact that the slightest bruises and wounds of scorbutic persons may degenerate into offensive bloody and fungous ulcers, which are prone to spread with great rapidity, which are cured with the greatest difficulty. The distinguishing characteristics of scorbutic ulcers, as given by Dr. Lind, are as follows:

"They do not afford a good digestion, but a thin fœtid matter, mixed with blood, which at length has the appearance of coagulated blood, and is with great difficulty wiped off or separated from the parts below. The flesh underneath these sloughs feels to the probe soft and spongy. No irritating applications are here of any service for though such sloughs be with great pains taken away, they are found again at next dressing, when the same bloody appearance always presents itself. Their edges are generally of a livid color and puffed up with excrescences of luxuriant flesh arising under the skin. When too tight a compression is made, in order to keep these excrescences from arising; they are apt to have a gangrenous disposition; and the member never fails to become swelled, painful and for the most part spotted. As the disease increases, they come at length to shoot out a soft bloody fungus, which the sailors express by the name of Bullock's liver; and indeed it has a near resemblance, in consistence and color, to that substance when boiled. It often rises in a night's time to a monstrous size, and although destroyed by caustics, or the knife (in which last case a plentiful bleeding generally ensues, is found at next dressing as large as ever. They continue, however, in this condition a considerable time without tainting the bone. The slightest bruises and wounds of scorbutic persons degenerate sometimes into such ulcers. Their appearances on whatever part of the body, is singular and uniform; and they are easily distinguished from all others, by being so remarkably offensive, bloody and fungous, that we cannot here but take notice of the impropriety of refering many inveterate and obstinate ulcers on the legs, with very different appearances, to scurvy; which are generally best cured by giving mercurial medicines; whereas that medicine in a truly scorbutic ulcer is the most dangerous and pernicious that can be administered."

In like manner Dr. David Macbride in his "Methodical Introduction to the Theory and Practice of Physic," London, 1772, p. 618, affirms that:

"The slightest wounds and bruises in scorbutic people degenerate into foul and untoward ulcers. And the appearance of these ulcers is so singular and uniform that they are easily distinguished from all others. Scorbutic ulcers afford no good digestion, but a thin and fœtid ichor mixed with blood, which at length has the appearance of coagulated gore lying caked on the surface of the sore, and is with great difficulty wiped off or separated from the parts below. The flesh underneath these sloughs feels to the probe soft and spongy, and is very putrid. No detergents nor escharotics are here of any service; for though such sloughs be with great pain taken away, they are found again at the next dressing, where the same sanguinous putrid appearance always presents itself. Their edges are generally of a livid color, and puffed up with excrescences of putrid flesh arising from below the skin. As the violence of the disease increases, the ulcers shoot out a soft bloody fungus, which often rises in a night's time to a monstrous size, and although destroyed by caustics, actual or partial, or cut away with the knife, is found at next dressing as large as ever. It is a good while, however, before these ulcers, bad as they are, come to affect the bone with rottenness."

Sir Gibert Blane, in his "Observations on the Diseases of Seamen," affirms that there is no complaint more hurtful to the public service, by sea and land, and more afflicting to the individual than ulcers.

"It is found, says Dr. Blane, in the work just referred to "from direful and multiplied experience, that not only those who are affected with natural symptoms of scurvy, but those who are exposed to the causes of it, and whose constitutions are in such a train as to fall into it, are particularly susceptible of ulcers of the most malignant kind, from the smallest injury which breaks the skin. This might naturally be expected, from what has been said from the great debility of the fibres, and deficiency of the powers of renovation and nutrition in this disease. The characteristic symptoms of such ulcers, are, a thin, fetid discharge, commonly mixed with blood, which sometimes coagulates on the surface. The ulcerated surface is soft and spongy, generally elevated above the level of the surrounding skin, particularly about the edges, where there are excrescences of luxuriant flesh, which in the more advanced state of the ulcer, shoots into a soft bloody fungus, called by the sailors bullock's liver.—*Third Ed., London,* 1799—*p.* 502.

Dr. Blane records a number of important observations showing the tendency to foul gangrenous ulcers amongst seamen. On board the Ganges, of seventy-four guns and six hundred men, during the year 1798, the tendency to the complaint was such that the smallest sore, whether from a hurt or a pimple, fell into the state of an ulcer. Blistered parts were also affected in the same manner. Sores which seemed to be in a healing state would suddenly become gangrenous. A black speck in the middle was the constant precurser of this. In the most severe cases the ulcers began with violent inflammation, which suddenly terminated in mortification; destroying in a short time the fleshy parts, so as to expose the bone, which soon became carious.

The crew of the Triumph, of seventy-four guns and six hundred men, suffered severely from malignant ulcers during the summer and autumn of 1798. Not only wounds and blisters fell into the ulcerated state, but a scartch or boils and the orifice of the arm after bleeding, were subject to the same accident. Sores which seemed to be in a healing state, would suddenly and without any visible cause, spread again, and become foul and bloody, extremely painful, and would resist every means of cure.

This unfavorable change always began, as in the Ganges, with a black spot in the middle of the ulcer. Ulcers of the same kind prevailed to the most dreadful degree, in the ships serving at the Cape of Good Hope, and in the Naval Hospital there, in the years 1796 and 1797. These foul ulcers produced the most severe and protracted sufferings, terminating frequently in the loss of limbs or life, or both. Nor were they confined to the lower extremities, for the ossa-ilium, the *scapula* and *cranium* would sometimes become *carious.* It became frequently necessary to amputate at the hospital, and it was observed that if the patients who underwent the operation, remained in the wards, with the ulcers, few survived, owing to the gangrenous and ulcerous states of the stumps; but when they were carried into a separate apartment, the large majority recovered.

It was also observed, both in the ships and at the hospitals, where this species of ulcer prevailed, that the hands of those who dressed them, where the skin was broken, were attacked by the same sort of ulcer.—*Observations on the Diseases of Seamen,* by Gilbert Blane, M. D.—pp. 506–512.

Dr. Thomas Trotter, in his *Medicina Nautica*, has, in like manner, recorded a large number of instances where malignant gangrenous ulcers have arisen spontaneously in various ships, and attacked with violence, not only external injuries, but in a number of cases, where neither wound, puncture, scab, or contusion could be said to have first taken place, a circumscribed red spot would at first be perceived, scarcely to be felt, but in a few hours rising to a pimple, becoming black in the centre and inflamed around the edges, till it increased in size, swelled and assumed every characteristic symptom of malignant ulcer, with constant fever and subsequent ulceration, slough and fetid discharge. This malignant ulcer or gangrenous ulcer attacked also the flesh wounds made with the lancet in bleeding, for different inflammatory diseases, as catarrhs and sore throats. Contused spots, even where the cuticle was not broken, were not exempted from the general tendency to ulceration. But parts that had been scalded or burnt, above all accidents, most quickly assumed the nature of this horrid sore, spread and inflamed more rapidly, and in the end put on the most formidable appearance; deeper and larger sloughs were the consequence, and symptomatic fever violent in proportion. Even in the early stage, sometimes before the cuticle had burst so as to expose the naked surface, buboes appeared in the groin and axilla, not to be touched without much pain, and always attended with fever. These, however, seldom suppurated; but where they did, they constantly exhibited the complexion of the parent sore. (Medicina Nautica, an Essay on the Diseases of Seamen, by Thomas Trotter, M. D., Sec. Ed., 1804, vol. 2. pp. 169—230; vol. 3d, pp. 497—504).

Dr. Trotter, in the third volume states that in the summer of 1799 the malignant ulcer made its appearance on board the Temeraire, with all the characteristic symptoms and violence which marked it in other ships. Every wound, abrasion of the cuticle, blistered part, scald or burn, passed rapidly through the various stages of inflammation, gangrene and sphacelus; in a few days leaving the bones almost bare, from the separation of immense sloughs.

The tendency of the bones to *caries* after inflammation in this disease, was more frequent than any other species of ulcer, and in many cases rendered the cure very tedious and painful; and many cases sank under the long confinement necessary to the separation of the dead bones.

Dr. George H. B. Macloed, in his "Notes on the Surgery of the War in the Crimea," states that

> "The French suffered most dreadfully from hospital gangrene in its worst form. The system they persued, of removing their wounded and operated cases from the camp to Constantinople at an early date, the pernicious character of the disease, tended to render it fatal when produced. Many of their cases commenced in camp, but the majority arose in the hospitals on the Bosphorus, where the disease raged rampant. In the hospitals of France it also prevailed, and, from what M. Lallour, Surgeon to the Euphrates transport, tells us in his paper on the subject, it must have committed great ravages in their ships, from one of which he says, sixty bodies were thrown over during the short passage of thirty-eight hours to the Bosphorus. With them the disease was the true gangrene, and attacked not only open wounds but cicatrices, and almost every stump in the hospitals."

By the official reports of the Medical officers of both the English and French Armies, during the Crimean war, it was conclusively shown that, nothwithstanding the extraordinary exertions of these powerful nations, holding undisputed sway of both sea and land, scurvy and a scorbutic condition of the blood, increased to a fearful degree the mortality, not only of gun-shot wounds, but of all diseases, and especially of pneumonia, diarrhœa and dysentery.

We might add many other facts from various authors establishing the spontaneous origin of malignant spreading gangrenous ulcers, in many navies and armies, as the result of scurvy and crowding; but the facts just recorded are sufficient to show that the foul scorbutic ulcers, and hospital gangrene, and the accidents from vaccination, arising at Andersonville, were by no means new, in the history of medicine, and that the causes which induced these distressing affections have been active in all wars and sieges, and amongst all armies and navies.

In truth these men at Andersonville were in the condition of a crew at sea, confined upon a foul ship, upon salt meat and unvarying food, and without fresh vegetables. Not only so, but these unfortunate prisoners were like men forcibly confined and crowded upon a ship, tossed about on a stormy ocean, without a rudder, without a compass, without a guiding star, and without any apparent boundary or end to the voyage; and they reflected in their steadily increasing miseries, the distressed condition and waning fortunes of a devasted and bleeding country, which was compelled, in justice to her own unfortunate sons, to hold these men in this most distressing captivity.

The Federal prisoners received the same rations in kind, quality and amount, issued to the Confederate soldiers in the field. These rations were, during the last eighteen months insufficient, and without that variety of fresh meat and vegetables, which would ward off scurvy from soldiers, as well as prisoners.

As far as my experience extended, no body of troops could be confined exclusively to the Confederate rations of 1864 and '65 without manifesting symptoms of the scurvy.

The Confederate ration grew worse and worse as the war progressed, and as portion after portion of the most fertile regions of the Confederate States were overrun and desolated by the Federal Armies. In the straightened condition of the Confederate States, the support of any army of fifty thousand prisoners, forced upon their hands by a relentless policy, was a great and distressing burden, which consumed their scant resources, burdened their rotten lines of railroad, and exhausted the over-taxed energies of the entire country, crowded with refugees from their desolated homes. The Confederate authorities charged with the *exchange of prisoners*, used every effort in their power consistent with their views of national honor and rectitude, to effect an exchange of all prisoners in their hands, and to establish and maintain definite rules by which all prisoners of war might be continuously exchanged as soon as possible after capture.

Whatever the feelings of resentment on the part of the Confederates may have been against those who were invading and desolating their native land, which had been purchased by the blood of their ancestors from the Indians and English, the desire for the speedy exchange and return of the great army of veterans, held captives in Northern prisons, was earnest and universal; and this desire for speedy and continuous exchange on the part of the government, as well as on the part of the people, sprang not merely from motives of compassion for their unfortunate kindred and fellow-soldiers, but also from the dictates of that policy, which would exchange on the part of a weak and struggling people, a large army of prisoners (consumers and non-combatants), requiring an army for their safe-keeping), for an army of tried veterans.

Apart from the real facts of the case, it is impossible to conceive that any government in the distressed and struggling state of the Confederate States, could deliberately advocate any policy which would deprive it of a large army of veterans, and compel it to waste its scant supplies, already insufficient for the support of its struggling and retreating armies.

And the result has shown that the destruction of the Confederate Government was accomplished as much by the persistent retention in captivity of the Confederate soldiers, as by the emancipation and arming of the Southern slaves, and the employment of European recruits.

And still farther to show that these accidents attending vaccination at Andersonville were active in Northern prisons, we quote the testimony of a medical officer who occupied during the war a distinguished position in the Medical Department of the United States Army.

Dr. Frank Hastings Hamilton, late Lieutenant-Colonel, Medical Inspector, U. S. A., in his "Treatise on Military Surgery," records the following facts, which have an important bearing upon the subject under consideration:

> "In still further confirmation of the correctness of our views, we will mention that in many of the regiments stationed in Kentucky and Tennessee during the summer of 1863, all slight wounds, such as scratches, slight burns, etc., took on an ulcerative action, and often became ugly and intractable sores. Vaccination almost constantly produced the same results, and was in many cases followed by abscesses in the axillary, cervical and other glands.
>
> "Upon the evacuation of Murfreesboro by the Confederate Army, on the first of January, 1863, 1673 sick and wounded soldiers were left on our hands; of these 250 were sick, and 1423 were wounded. The whole number were placed in charge of Dr. Avent, the intelligent Medical Director of General Bragg's army, assisted by several other Confederate surgeons, and were allowed to remain in the buildings which they had originally taken as hospitals, and which were the best the place afforded. On the twentieth of May, 1863, nearly five months after the battle of Stone's River (Murfreesboro), Dr. Avent reported to us that 640 of these men had died, and 55 remained in the hospital, the remainder having been sent off for exchange. The ratio of deaths, continues Dr. Avent, allowing the same percentage for the 55 now on hand, is about 38½ per cent. I have not separated the sick in this calculation from the wounded, from the fact that the hospitals were common to both; consequently I have no positive data on which to make an estimate of the relative mortality. I am satisfied, however, that the mortality amongst the sick has been much less than of the wounded. An estimate, placing the percentage of the wounded at about 40, I think would not be far wrong; which loss, you will discover, is unprecedented in any previous battle between the present belligerents.
>
> "In explanation of this great mortality after wounds, Dr. Avent proceeds to offer several facts, namely: overcrowding of the patients in the hospital buildings, mental depression, the fact that only the most severely wounded were left behind; but he gives especial prominence to the physical condition of the men, in consequence of a prolonged absence in their food of anti-scorbutic articles, both before and since their capture."

We have here a far heavier mortality amongst these Confederate prisoners than amongst the Andersonville prisoners; and according to the published statements of the United States Government, the majority of deaths during the war was largely on the side of the Confederate soldiers confined in Northern prisons. And after careful inquiries amongst returned Confederate prisoners, I am convinced that the accidents attending vaccination were quite as numerous and severe in Northern prisons as in Southern; and the causes of death amongst prisoners in both sections were not materially different, with this exception, that the heat of the Southern States was balanced by the effects of severe cold upon feeble scorbutic men with insufficient clothing.

We have dwelt thus long upon this subject, because we have considered its discussion of paramount interest in the history of vaccination, and of the medical profession in America.

In many cases, occurring in the Confederate Army, the deleterious effects of vaccination were clearly referable to the condition of the forces, and the constitution of the blood of the patients, for it was observed in a number of instances that the same lymph from a healthy infant, inoculated upon different individuals, produced results corresponding to the state of the system; in those who were well-fed and robust, producing no ill effects, whilst in the soldiers who had been subjected to incessant fatigue, exposure and poor diet, the gravest results followed.

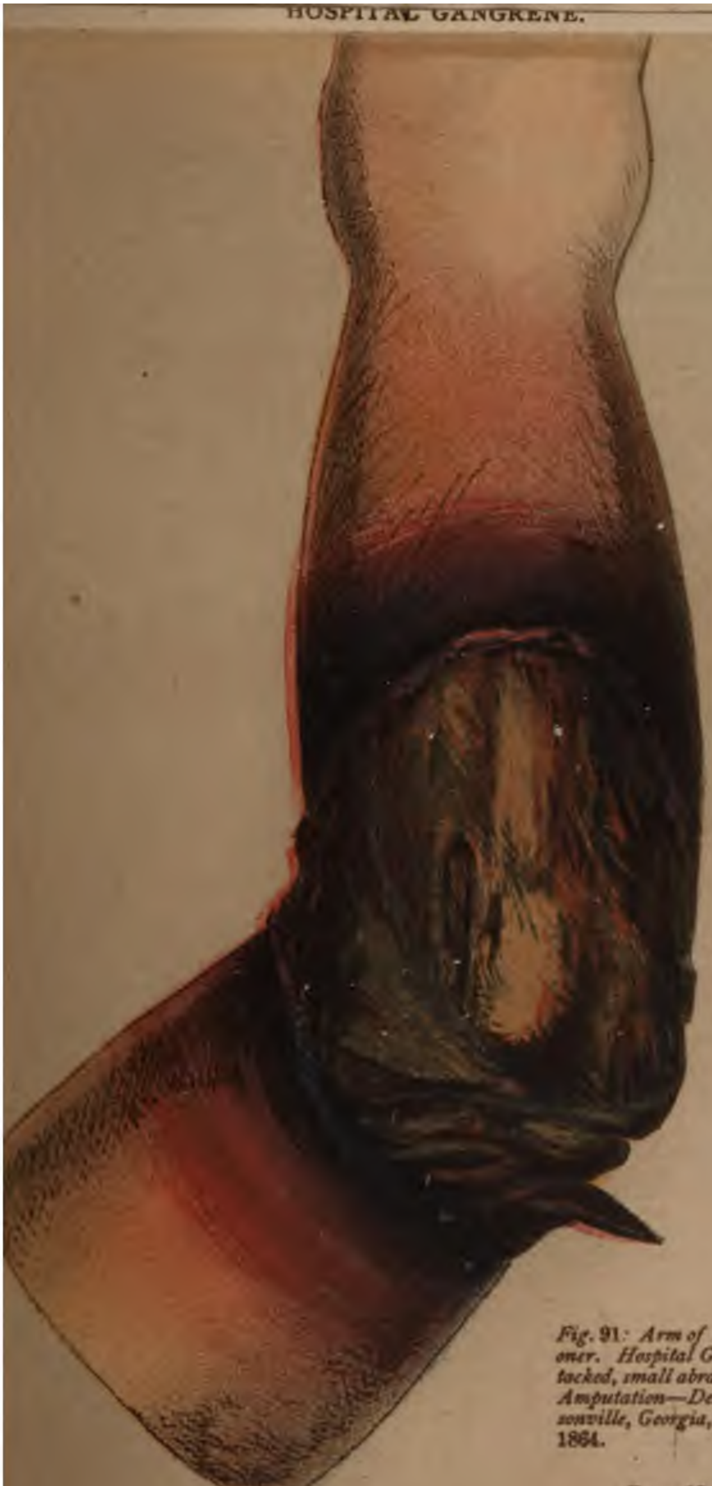

Fig. 91: Arm of Federal Prisoner. Hospital Gangrene. Attacked, small abrasion near elbow. Amputation—Death. Andersonville, Georgia, September 20, 1864.

From Nature by
JOSEPH JONES, M. D.

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As this subject is of vast importance in its relations to the theory and practice of vaccination, and in its bearing upon the fair name and honor of the American Medical Profession, we have substantiated the statements by the following illustrations, drawn from nature:

Plate 22, Figure 91—Arm of Federal prisoner, attacked by hospital grangene, in the military prison, and transferred to the military prison hospital. The gangrene attacked a small abrasion or scratch near elbow joint. The arm was amputated about midway between the elbow and shoulder joints. Hospital gangrene attacked the amputation, and death resulted from exhaustion and septic poisoning.

The following is the official report of my testimony, with reference to vaccination of Federal prisoners at Andersonville, delivered in the *Military Court* at the "*Trial of Henry Wirz*:"

"By counsel—Q. Did you say anything about vaccination in your report?

"A. I saw some cases of injury from vaccination. I do not recollect exactly what I stated in my report on that subject, but I can tell you what I did by referring to it. There were a number of instances, I think some dozens of instances, that I was informed of; I did not see more than one or two instances myself; they occurred previous to my going there. The case which I examined more particularly was a case of amputation of the arm from vaccination, and upon carefully examining it, I was led to believe that it was in consequence of the condition of the system of the man, rather than from the matter introduced, from the fact that severe injuries were frequently attended with gangrene in that foul atmosphere.

"From the crowded condition, filthy habits, bad diet, and dejected, depressed condition of the prisoners, their systems had become so disordered that the smallest abrasion of the skin, from the rubbing of a shoe, or from the prick of a splinter, or from scratching, or a musquito bite, in some cases, took on rapid and frightful ulceration and gangrene." (*Fortieth Congress, Second Session, House of Representatives.* Ex. Doc. No. 23, TRIAL OF HENRY WIRZ. Letter from the Secretary of War *ad interim*, in answer to the resolution of the House, April, 16, 1866, transmitting a trial of Henry Wirz, December 7, 1867. Referred to the Committee on the Judiciary and ordered to be printed. P. 642, p. 625.)

The following is the record which I made on the Confederate Military Prison Hospital at Andersonville:

The drawing, Plate 22, Figure 91, was made by myself from the arm of a Federal prisoner, who had scratched and abraded the skin around the bite of some insect, most probably that of a mosquito, inflicted in the stockade.

The abrasion did not heal, but gradually assumed a dark, unhealthy hue; and the irritation commenced to spread. In two weeks it had reached the size of a silver half-dollar. This patient was then transferred to the Confederate States Military Prison Hospital, and in the course of six days it reached the size and presented the appearance represented in the drawing (Plate 22, Figure 91). When I examined this patient the constitutional symptoms were well marked—hot, dry skin; small, rapid, feeble pulse; leaden, sallow, unhealthy hue of complexion; dejected, distressed countenance; coated and tremulous tongue. The stench emitted from this gangrenous mass presented a ragged, pulpy, putrescent mass, without pus, and with ragged, everted edges, elevated above the surrounding tissues. It was also surrounded by a livid blue and deep purple border on the skin. The deep blue and purple areola is a sure index of the spread of hospital gangrene. The patient was most urgent in his entreaties for the removal of the arm, and it was decided, upon consultation with the attendant medical officers, that his condition could not be rendered worse by an amputation, which would substitute a smaller flesh wound for this most extensive and foul ulcer, invading the joint and exciting intense pain.

Notwithstanding the probability that in the condition of the system of the patient, in this foul atmosphere, the gangrene would return again in the stump, it was, nevertheless, considered proper to amputate, on account of the reasons just given.

Numerous amputations had been performed in the Confederate States Military Prison for gangrene supervening upon slight injuries, and attacking scorbutic ulcers. I endeavored to collect all the cases with the results, but the records were imperfect and incomplete. Upon the incomplete reports, 266 cases of hospital gangrene were recorded; out of sixty-six amputations in consequence of the disease with twenty-five deaths; one hundred and two cases are given as supervening upon gun-shot wounds, and the remainder were reported as gangrenous ulcers arising from the scorbutic and deranged condition of the system.

Twelve cases of gangrenous ulcers were recorded as following vaccination.

These figures are far below the truth.

Many cases of gangrenous ulceration which were in the hospitals, were originally entered upon the hospital registers under the head of scurvy, diarrhœa, dysentery, or some other disease.

Hospital gangrene returned almost invariably after amputation in these scorbutic and enfeebled patients, and in this infected atmosphere; and in some cases the disease reappeared in the stump within thirty-six hours after the operation.

I extract the following from a report on hospital grangrene at Andersonville Prison, drawn up by Assistant Surgeon A. Thornburgh, of the Confederate Army, in response to my official request:

"Early in the spring (1864) small-pox made its appearance in the prison, and as a prophylactic measure, we were ordered to vaccinate all who could not show the proper vaccine scar; consequently we went to work, and in a week or ten days two or three thousand were vaccinated. Out of this number, nearly every prisoner who happened to be affected with scurvy was attacked with ulceration of the pustule. These small ulcers soon began to slough, and extend over a large extent of surface; when the superficial sloughs were separated, the parts beneath were found to be in an unhealthy, sloughing condition; finally these ulcers would become phagedenic, and destroy every structure in their track for a considerable extent. In this condition gangrene would set in, and if the disease was not speedily arrested by powerful escharotics, emollient poultices, and the proper vegetable diet, amputation became necessary, or the poor sufferer sank under this irritation. Diarrhœa and dysentery frequently supervened, and speedily destroyed the patient."*

That exposure, hardship, improper and scant and salt food had propuced a similar condition in the Confederate troops is conclusively shown, by Plate 23, Figure 92. Leg of J. S. Cole, private Third Regiment, Georgia, Reserves; guarding Federal prisoners at Andersonville, Georgia, September 22, 1864, while guarding the stockade, hospital grangrene attacked some abrasions of the skin on the right foot and leg.

The following is the detailed statement of this case:

"Case 54.—General Hospital for Confederate soldiers, Andersonville, Goorgia, September 22, 1864. Thomas Cole, private 3d Regiment, Georgia Reserves, Company H. Age-sixteen years; height, five feet nine inches; weight in health, 150 pounds. Arrived at Andersonville on the twentieth of July. Was engaged in guarding prisoners at the stockade. Performed guard duty every third day; two hours on and four hours off, during the twenty-four hours. Before leaving home, received a slight scratch on the side of the left foot, a little below the ankle. This boy did not usually wear shoes at home, and on the way to Andersonville the shoes bruised and enlarged the small injury. This small abrasian did not heal after the commencement of his duties as a soldier at Andersonville.

It did not, however, give him any special trouble, or appear inflamed, until about the first of September, forty-two days after his arrival at this post.

Up to this time this young recruit had never been inside the stockade, and had never stood guard around or within the hospital. On the fourth of September, the patient was compelled to quit duty, and on the twelfth instant he was transferred to the Confederate General Hospital.

At the time of his entrance into the hospital, the gangrenous spot was not larger than a silver half dollar, and presented an inflamed areola on the sound skin, elevated, everted edges, and elevated pulpy, ragged greenish central mass.

Up to the date of making the drawing, the gangrene has spread rapidly, presenting the appearance represented in Plate 23, Figure 92.

Hemorrhage was constantly taking place from the numerous small eroded vessels, and hence the red and mattlered appearance of certain portions of the gangrenous mass. Several smaller gangrenous spots were visible upon the leg and are represented in the figure. These are said to have arisen spontaneously; that is without any preceding abrasian or injury. The black mass in the centre of the large ulcer upon the ankle joint, appeared to be the surface of the necrosed bone.

The constitutional symptoms were well marked in this case. At night when I examined the patient he had hot fever, with rapid pulse, pale aneamic, sallow, unhealthy complexion. This morning has less heat of surface, and the pulse is less frequent, but still there is febrile excitement, and he is very nervous and weak; cries like a child when his wound is touched, even in the gentlest manner. Bowels loose; had a large, loose, yellow, very offensive evacuation whilst I was engaged in executing the sketch.

Plate No. 24, Figure 93: Hand of W. J. Black, Confederate soldier, poisoned in dressing, hospital gangrene, October 3, 1864.

The following record of this case was made by myself during the investigations on hospital gangrene, instituted in the Empire Hospital, Vineville, Georgia:

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*Surgical Memoirs of the United States Sanitary Commission. Investigations upon Hospital Gangrene as it prevailed in the Confederate Armies, 1861-1865, by Joseph Jones, M. D., formerly Surgeon in the Provisional Army of the Confederate States. New York, 1871; p. 528.

Case 7, Empire Hospital, Vineville, Georgia. W. J. Black, Company "G," Lee's Invalid Battalion; aged forty-six years Native of Troup county, Georgia. Farmer by occupation. Height, 5 feet 9 inches; weight, in health, 160 pounds; black hair and eyes; florid complextion. Has been in Confederate service three years and three months. Served two years with "Stonewall" Jackson. Was wounded about one year ago in Maryland; lost the first joint of the second finger, and has not been in field service since. Has been acting as a nurse in this hospital for the past two months, since the conversion of this hospital into a gangrene hospital.

During this time has been inoculated with hospital gangrene twice. The first attack was caused by a prick of a pin on the side of the hand, received in dressing a gangrenous wound. The prick of the pin became painful almost immediately, and in the course of two days the injury commenced to inflame, and the surface around assumed a purplish and bluish color. The disease spread from the centre of infection, and the slough presented a grayish and greenish color. The inflamed and gangrenous parts were freely cauterized with strong nitric acid. By this means the gangrene was arrested before the ulcer had exceeded one-quarter of an inch in diameter. This occurred in the beginning of September, about one month before the drawing was made. The constitution did not appear to suffer, the wound healed readily, and the patient resumed his labors as a nurse to the gangrene patients.

Had not been engaged in dressing the gangrenous wounds more than two or three days before a small blister appeared on the third finger of his right hand, which gave much pain, and in the language of the patient "throbbed as if a bone was breaking loose." The blistered surface assumed a gray and greenish color, and was surrounded with a purplish and blue halo in the skin. The gangrene commenced to spread rapidly. Concentrated nitric acid was immediately applied three times a day, but it did not arrest the gangrene.

It appears that in the first inoculation, the system was not specially involved, and the local treatment arrested the disease. But the continued residence in this infected atmosphere, and the constant attention upon the gangrenous wounds, gradually poisoned the system of this faithful nurse to such an extent, that in the second attack the local treatment did not arrest the disease.

On the third of October, 1864, just twelve days after the commencement of this second attack of hospital gangrene, I executed the drawing (Plate 24, Figure 93).

The gangrene is progressing along the upper border, under the bluish discolored skin of the third finger of the right hand. The color of the skin in this portion of the wound, where the gangrene is progressing most rapidly, was of a most remarkable deep blue. The lower portion of the ulcer appears to be improving somewhat, and now discharges a little pus.

The constitutional disturbances, notwithstanding the comparatively small surface involved, are well marked, pulse accelerated and feebler than in health. Face flushed. During the execution of the sketch of his right hand, suffered much pain from the confined position of the hand; was very restless and nervous, and was much nauseated, and attempted several times to vomit. Hands tremble from the nervous exhaustion. No appetite. Tongue of a purplish, bluish, leaden color. Has fever in the morning, which declines toward the evening. Feels weak, nervous, feverish and depressed. Urine brownish red and scant.

On the seventh of October, gangrene still spreading. Patient sent out of Hospital into the country.

The history of vaccination in the Army of Virginia, under General Lee, was of great interest, in the light which it threw upon these questions, and it is with deep regret that we learn that all the most valuable field reports were destroyed.

The following letter from Dr. L. Guild, formerly Medical Director of the Army of Northern Virginia (General Lee's Army), was received in reply to my request, for the experience upon this subject, of this surgeon, who had held one of the most responsible and distinguished positions in the Medical Department of the Confederate Army.

MOBILE, ALA., Decembe 12, 1866.

Professor Joseph Jones :

Dear Sir—Your letter of the fifth inst., has been received. It would afford me great pleasure to contribute to your contemplated monograph on "Spurious Vaccination," but in the retreat of the Army of Northern Virginia from Petersburg to Appomattox Court-House, all of the retained papers, professional notes, reports, etc., of my office were either destroyed by the enemy or burned, with other baggage, by our own people for the purpose of lightening our trains, and facilitating the movement of our retreating columns. When the boxes were burned their contents were, of course, unknown to those entrusted with the execution of the order. On account of this unfortunate occurrence, I have nothing with which to refresh my memory accurately, in a single case, out of a vast number that came under my observation.

The subject of transmission of syphilis through the vaccine virus is a most interesting and important one to the profession—admitting great diversity of opinion, and, as you truthfully remark, "one well-reported case is worth volumes of mere opinions and assertions"

I know of no one who could report such a case, but much useful information on the subject can be furnished by Dr. R. J. Breckinrigde—now of Houston, Texas—formerly of Louisville, Ky. He was one of the Medical Inspectors of the Army of Northern Virginia, and it was his duty, on several occasions, to collect all interesting facts and opinions on the subject, such as the nature and character of the ulcers following vaccination, anterior history of patients, effects of treatment constitutional and local; etc., etc.

I regret my inability to furnish something worthy of your consideration

Respectfully, yours, etc., L. GUILD.

The testimony of Dr. S. E. Habersham, upon this cause of the abnormal phenomena accompanying and following vaccination, is clear and important.

The following report was placed in my hands by its author, and was accompanied with the following answer to my request and inquiries:

SUMMERVILLE, April 28, 1866.

Dr. Joseph Jones:

Dear Sir—The accompanying report of an anomalous disease or the result of vaccination, was written shortly after its first appearance in the Army of Northern Virginia, and after a careful study of the cases especially assigned to the hospital under my charge for "treatment and report." At the time there was much discussion among the medical staff, both in field and hospital, as to the ætiology and pathology of the manifestation which by some, and, indeed, most of the observers, was attributed to impure virus, and especially syphilitic inoculation. This latter opinion was ingeniously advocated by Surgeon Breckinridge, and no doubt many cases may have resulted from such an accident. In none of the cases, however, assigned to my division of Chimborazo Hospital, could I discover a sufficient number of symptoms to lead me to suppose that such might have been the cause, either in its prodoma or development, hence I could not attribute the cause of the eruption to any other than that assigned in the report. This view as to its ætiology was subsequently very ably maintained by Surgeon Frank A. Ramsey, in a report referred to me by Surgeon-General Moore, and which was preserved among my papers, but lost at the time of the evacuation of Richmond, together with the history of all the cases, and diagrams intended to illustrate the above report. In consequence of the loss of these papers, this report is not as perfect as it should be; but I hope the general description and history of the disease is sufficiently clear and comprehensive to embrace everything of practical importance concerning this horribly disgusting and filthy accident, or result of vaccination, as seen in our army.

Since the termination of the war, I have had several opportunities of conversing with a few intelligent surgeons of the Federal Army, and ascertained from them that such a disease had appeared among their soldiers in regions of country where the scorbutic diathesis manifested itself among the troops, and to which the disease was generally attributed by them, though there were also surgeons of that army who attributed it to syphilitic inoculation. I find the same view as advanced in the accompanying report held by most of the Surgeons of the Federal Army, as stated in Circular No. 6, Surgeon-General's Office, United States Army, November 1, 1865.

If you think my report of sufficient importance to appear upon the pages of your journal, or if it can in any way advance the cause of medical knowledge; you are at perfect liberty to make use of it for that purpose.

With much respect, I remain, very truly, your obedient servant,

S. E. HABERSHAM.

Report on Spurious Vaccination in the Confederate Army. By S. E. Habersham, M. D., Surgeon in the Provisional Army of the Confederate States:

CHIMBORAZO HOSPITAL, Division No. 2, November, 1863.

To Surgeon W. A. Carrington, Medical Director:

Sir—I have the honor to inform you that, in accordance with your order of the twenty-ninth June, 1863, I have received all the patients sent into this Division, with a "peculiar eruptive disease," supposed to be the consequence of vaccination, and herewith forward you the results of my investigation in this anomalous affection.

In compliance with an order issued from the Surgeon General's office. in the month of November, 1862, general vaccination was practiced upon all soldiers as soon as they were *admitted in this Division*, and in order to insure the full protective influence of vaccina-

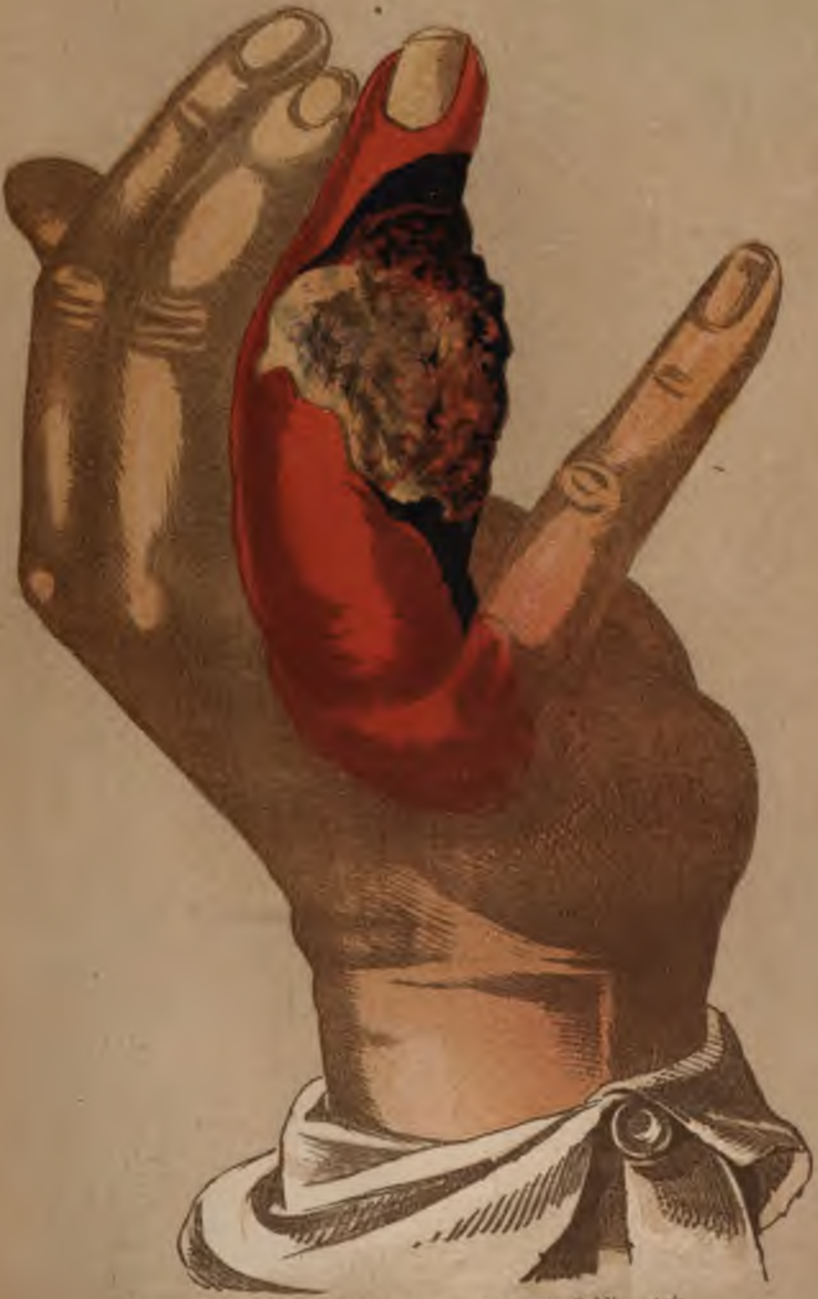

Fig. 93: Hand of Confederate Soldier, poisoned by prick of pin—in dressing Hospital Gangrene. W. J. Black, C. S. A., October 3d, 1864.

From Nature by
JOSEPH JONES, M. D.

NEW ORLEANS LITH. Cº 10 UNION ST.

tion (not anticipating any evil consequences therefrom), the order was strictly obeyed, and all the patients, even those having recent scars upon them, were re-vaccinated. A few days after the insertion of the virus, and, in many cases, within twenty-four hours, the seat of punctnre became very much inflamed, with a deep inflammatory blush around it, which gradually implicated, in the severe cases, nearly the whole of the affected limb. A pustule rapidly formed, instead of a vesicle, which very soon discharged an ichorous fluid. This fluid was, in the course of forty-eight hours, converted into a dark, mahogany-colored irregularly-shaped scab, prominent, and firmly attached at its base. A dark-red areola of several lines in diameter, measuring from the edge of the scab, was then developed, which, in turn, seemed to exude an ichorous serum. This was soon converted into a scab surrounding in juxtaposition the first, and presented the appearance of a single scab. This process continued for several days, and there was often formed a scab, one inch or two and a-half in diameter. "Pari passu" with the increase of this scab, the erysipelatous blush on the limb diminished, and when the blush had disappeared, this scab ceased to enlarge. As this inflammatory process subsided, the discharge lost its serous character, and seemed to be converted into pus, which exuded from under the scab, loosening its firm attachment at its base, and thus rendering it liable to be removed prematurely by the patient in his sleep, or even by the friction of his clothing. When this occurred, a foul bleeding, irregularly-shaped phagadenic ulcer was revealed, with everted edges, and presenting the appearance of a syphilitic phagedenic-ulcer, involving the subcutaneous areola tissue, exposing, in many cases, the muscular tissue below. The process of destruction of parts did not end here, for the ulcer continued to increase, and from the loosened edges an ichorous discharge continued to pour out from under the skin which seemed to destroy the edges of the ulcer, thus increasing its dimensions. Wherever the ichorous pus from this ulcer touched the sound skin, another pustule of a similar character was formed, in some cases reaching the size of the primary sore This, however, was seldom the case, but a smaller ulcer generally resulted, which often healed and cicatrized before the first.

The axillary glands, when the arm was affected, and the inguinal glands, when the leg was the seat of the disease, sometimes became inflamed and discharged pus, presenting the microscopic character of healthy pus. This enlargement of the glands, however, did not occur in a sufficient number of cases to make it a natural sequence of the disease. Attending the early stages of the formation of the ulcer, before pus was discharged, there was always more or less pyrexia, with furred tongue and loss of appetite; these symptoms disappearing as soon as ulceration was established. In these highly aggravated cases, successive crops of pustules made their appearance on the affected limb, often developing themselves also upon the lower limbs of the affected side, but seldom crossing the mesian line, and never developing themselves ubon the trunk or head.

The less malignant form of the disease resembled the first in character, but not in degree. For a few days after the insertion of the virus, merely a small inflamed spot was discerned, which seemed to be more the result of the injury done to the skin, by the prick of the lancet, than any inflammatory action resulting from a specific cause. About the fifth or sixth day a minute pustule was discerned upon a scarcely larger inflamed base. This pustule and areola gradually increased, but the diameter of the areola was not as great, and there was no deep inflammatory blush upon the arm, merely a diffused redness of several inches in diameter. The same process, however, took place—an exudation of serum from the areola—which, in turn, became a crust, and which gradually increased in size, but it never reached the diameter of the more malignant type; and when it was detached by the process of ulceration, which occurred at an early period, the revealed ulcer was neither as deep nor as malignant in its appearance. The edges were not everted, and there was no discharge of pus from under the edges of the ulcer; it only presented the appearance of an ordinary ulcer, showing no tendency to increase, and but little to heal. Pyrexia very seldom attended this form, nor was the appetite impaired.

The third and mildest form of the disease made its appearance as a small pimple, in from two to ten days after the introduction of the virus, and which gradually formed a pustule; a dark brown scab succeeded in from three to four days, which remained attached sometimes as long as two weeks, and when it become detached, a livid or brown spot was revealed, the size of which was equal to the scab. This scar, however, was very sensitive to the touch, and liable to bleed from the least friction of clothing, and when this occurred, it would exude serum or blood, and another scab would surely form. If the system became suddenly depressed from any cause, it would almost always assume the ulcerative process, and become a sloughing ulcer, which only healed with the general improvement of the system.

As thus described, this disease has prevailed in the Army of Virginia, both in field and hospital. The surgeons of the Army of the Southwest report its prevalence there. It was developed, in the early part of the year, in a cavalry regiment in the mountains of Virginia, the Colonel commanding suffering severely from the disease. In every case its origin has been traced to the introduction of vaccine virus into the system. How far su epidemic cause may have exerted its influence in its early development it is impossible even to surmise; we know, however, that it originated in Virginia, at a time when our Army was upon very short rations, and that many of the soldiers sent from the field at that time presented a decidedly scorbutic appearance. Many had been reduced and were broken down by exposure to the inclemency of a cold winter, and the depressing influences of low diet, want of clothing, and many other prolific causes of disease, calculated to deprive the blood of its healthy constituents, particularly of its fatty matter. Hence this may have produced a predisposition. In verification of this fact, I will state, that when it was found how frequently the disease in consideration supervened upon vaccination in this hospital in broken-down and depraved constitutions, it was deemed prudent to postpone the introduction of the virus until the patient was restored to a healthy condition by improved diet and medical treatment. At the first appearance of the evil consequences of vaccination I was inclined, with other surgeons, to believe that the virus was impure, and, because of this suspicion, I threw away the matter we then had, and obtained a vaccine scab from Dr Knox, a practitioner on Church Hill, who assured me he had used it in several cases with a perfect result.

The introduction of this virus into the arms of some ten patients resulted in the development of the disease in question in three of them, while in the remainder it produced apparently a true pustule. From this fact, and the immunity which healthy looking men enjoyed, I was led to believe that the predisposing cause existed in a vitiated and impoverished condition of the blood, and so reported in my first report, and that the introduction of pure virus into the system was the exciting cause of a latent disease. This view, I see, is also held by Surgeon Frank A. Ramsey, of the Department of East Tennessee, in a communication on file in office of Surgeon General. This view I have never had reason to change, though I am aware that many men, apparently in health, have suffered from the effects of vaccination.

In one case, which I here quote, the influence of a good condition of the general system seems to have exerted a wonderfully modifying influence.

Case No. 29.—J. L. Turner, a private, Company G, Fifth Virginia Cavalry, aged 27, married, parents healthy—he himself enjoying good health—never had any venereal disease. Entered the service, April, 1861—has been in service ever since, was vaccinated about a month ago, when in hospital at Farmville.

This patient, Turner, was vaccinated last winter by Assistant Surgeon Vaiden, of this division. It not having any effect upon his system, and feeling assured from this and previous vaccinations that he was proof against the effect of it, he insisted upon being vaccinated by Assistant Surgeon Moses, from the effects of which he has suffered since, and for which he was on the eighth of September admitted to this hospital, presenting the following appearance: A number of pustules, resembling impetigo, on left arm and leg, which were developed in successive crops, appearing as soon as the original pustule began to heal. This was a remarkably mild form of the disease, and was improving on cod liver oil, when he was furloughed on the twentieth of September, being a paroled prisoner. This patient was young, vigorous and comparatively healthy when he received this vaccine into his system.

The search, for parasitic or cryptogamic vegetation, with a good microscope, revealed none. The pustule was seldom developed where parasites make their habitation, namely, in the bulbs, or at the roots of the hair. The pus presented microscopic characteristics of pus globules floating in a homogenous fluid. These globules were not as abundant as in laudable pus, and not so distinctly nucleated, and were irregular in outline in some of the cases examined. This appearance of globules, however, often exists in healthy or laudable pus, when it has been exposed to air any length of time. In the many cases I have examined, I have yet to find a patient who will acknowledge that he has had any syphilitic disease at any period of his life, though many of them have had gonorrhœa. This exemption from syphilis, however, is not strange, since it is a very uncommon disease in the rural parts of our country, the inhabitants of which comprise the very large majority of our army. We also know that the tendency of the secondary form of syphilis is to develop itself in the forehead, chest, back, and trunk, generally, and yet no cases, developed upon these parts of the body, have presented themselves to my observation. Many of the patients, also, have suffered long enough to have had the tertiary form of syphilis, developed nodes, etc., and yet no such symptoms have been seen by me.

From what I can learn, the Army of the United States has so far escaped these evil results of vaccination. A few cases, however, originated among the Federal officers in the hospital of Libby Prison, who were vaccinated in the prison by one of their surgeons from his own arm, some weeks after their confinement, which presented all the characteristics of the disease as it has appeared in our army I was assured by these officers that they had neither seen or heard of such a result of vaccination in their army. Does not this fact alone lead us to infer that its cause of origin may be traced to some abnormal condition of the blood, in these cases, induced by confinement in a vitiated atmosphere, without the means of eliminating the *materies morbi* from the system by exercise and *care to the function* of the skin.

The classification of this disease is difficult and unsatisfactory, since it commences as a pustule, and assumes often the outward form of rupia, which, by all dermatologists, is classified among the bullæ. If we classify it among the pustulæ, we find no disease there describing it accurately, some cases resembling ecthyma, others impetigo. Inasmuch, however, as it oftener assumes the characteristics of chronic etchyma, either in a mild or aggravated form, according to the healthy or unhealthy condition of the patient, I propose to name it vaccine ecthyma. Like all chronic cutaneous diseases, it shows a decided tendency to return whenever the system becomes reduced from any cause, or when the patient is exposed to causes which produce an undue action in the circulation of the capillary system. An undue amount of exercise in warm weather seems to excite its appearance. This was illustrated in those soldiers supposed to be thoroughly cured, and who were about to be ordered to their regiments for duty, when a raid was threatened, in the month of July, upon the city of Richmond. These men were among the volunteers from the hospital to defend the city, and were marched through a hot sun some four miles to the lines at the extreme limits of the western end of the town. They returned with a new crop of pustules, which, however, healed by resolution in a short time.

Treatment—There is every reason to believe that the disease results from a blood disease, only to be eliminated from the system by enriching the blood and supplying its deficiency of fatty matter with rich nutritious food, and by the judicious use of alteratives. It is in vain to treat the ulcers locally, for without alterative treatment with nutritious diet, all the local applications which were tried seemed to aggravate rather than improve them; but as soon as the general condition began to improve, so did the ulcers. The milder cases began to improve a few weeks after admission without any treatment, except dietetic, in conjunction with the iodide of potash, syrup iod. ferri, and sarsaparilla; in others, merely applying simple dressing to the ulcers, was found sufficient to subdue it. Under this treatment all the cases gradually but slowly improved. In the early part of August we received a large supply of cod liver oil, and I was thus enabled to test fully the treatment which the supposed cause of the disease naturally suggested. Some few of the patients could not digest the oil, but those who could began rapidly to improve, and many were able to return to their regiments, whilst others were thought well enough to be transferred to their respective State hospitals, in compliance with an order issued at that time. Those who were unable to digest the oil continued the syrup iod. ferri, which was thought the best alterative indicated in their cases. Their improvement was scarcely perceptible. In the early part of September, however, another effort was made by them to take the cod liver oil, which they were enabled to do in a little whisky; their improvement soon became very evident to themselves, and, though not entirely well, the ulcers are rapidly granulating. No new pustules are being developed, and the patients are in a fair way to recover. I have no doubt that the best remedy has been found in the cod liver oil; and this, locally applied and internally administered, with an entire change of air and nutritious diet, will remove and eventually eradicate this obnoxious and filthy disease from the system.

From the above mentioned facts I am led to draw the following conclusions: That the disease is pustular at its first appearance; that it resembles ecthyma in its general character; that it is but a local manifestation of a general disorder, or vitiated condition of the blood; that this vitiated condition resulted from improper and spare diet, together with inattention to cleanliness, thus impairing the eliminating functions of the skin; that syphilitic virus has had no influence in producing the disease; that the morbid effects have in most of the cases resulted from deficiency in condition, independent of any imperfection in the vaccine virus; that the disease can only be removed by those means calculated to improve the general condition and restore the healthy play of all the functions.

Dr. James Bolton, of Richmond, Virginia, who enjoyed opportunities for the investigation of the abnormal phenomena manifested by vaccination in the Confederate Army, of the most extended and valuable character, attributed the so-called "*spurious vaccination*" to several causes. We present in this connection that portion of his reply which relates to the influence of diet, hardship, exposure and corroding upon the progress of the vaccine disease, reserving the facts which he adduces to establish the existence of syphilo-vaccination, to section 7, of this Inquiry.

RICHMOND, VA., February 25, 1867.

Joseph Jones, M. D.:

Dear Doctor—After various delays I send you my paper on Spurious Vaccination as it occurred in the Confederate Armies, only regretting that they were not forwarded at an earlier date. In addition to these, I am engaged upon some practical suggestions on Vaccination, and also upon the subject of Syphilo-Vaccination; but know not when I shall be able to furnish the papers. Very truly yours, JAMES BOLTON, M. D.

During the years 1863-4, a wide-spread epidemic of small-pox broke out in the Southern States. It was impossible to supply the demand for vaccine virus. Especially was this the case in the Confederate army, which was panic-stricken by the spread of the disease. An order for virus was sent to England through the blockade. It either was never sent, or was captured. A supply was sent through the lines by the Federal authorities; but this was totally insufficient for the wants of the prisoners alone. Under orders from the Surgeon-General in Richmond, the writer was engaged in propagating virus among healthy children, and vaccinating the employes of the various departments of the Government. The reports of these vaccinations[*] showed that more than thirteen hundred persons, chiefly adults, had availed themselves of the powerful influence of the prophylactic agent, and that of these, only one failed to obtain perfect protection. In that single instance, the varioloid eruption appearing two or three hours after the insertion of the vaccine virus, proved that the system had already become infected and that it was too late for the vaccine virus to have exercised the least protective or modifying influence. Nearly all of these persons had been previously vaccinated. It was observed that the susceptibility of the system to the virus was remarkably great. The presence of the variolous poison in the atmosphere seemed to increase the susceptibility of the system to the influence of its antitode.[†] By a rough estimate, the writer thinks that two-thirds of the persons operated on exhibited phenomena of vaccinia, or of some grade of vaccination.[‡] The same samples of virus were used upon nearly the whole of these without an unfavorable result in a single instance. Some of this virus, thus tested, was given to a Senator from Tennessee, whose physician reported, that having used the virus upon five members of the Senator's family, it produced no result in four cases, and those of a spurious character in the fifth. The youth's arm was almost covered with scabs of different thickness at different points, healing here and there, and breaking out again, and this succession presenting for many weeks subsequent to the vaccination. How can this be explained? This same sample of virus had been cultivated and extensively propagated by the writer for more than seven years, with none but normal results in any case. The fault was, therefore, clearly not the virus as originally furnished. But how had this virus been preserved? It may have been kept for some time about the person, exposed to heat and moist exhalations from the surface. These circumstances, most favorable to decomposition, may have caused a putrescent state in the vaccine crust.[‖] This crust would of course produce a putrescent zymosis in the patient, or an eliminative action, or it would be successfully resisted, and then its effects would be *nil*.[§] Or it may be explained in another way. There may have been some occult influence, atmospheric or some other, so affecting the constitution of these persons at the time that true, vaccine zymosis was prevented or perverted. At this exigency the writer offered to supply the Medical Department with an abundance of pure vaccine virus. Having received instructions from Surgeon-General S. P. Moore,[¶] he traveled for four weeks among the plantations in the interior of Virginia, vaccinating whites and negroes, and retracing his steps for the purpose of gathering the crusts. The result of this expedition was about eight hundred crusts, mostly from healthy negro children. This was distributed extensively through the army, and no further reports reached the writer of abnormal results. Among all the children vaccinated during this tour, one only presented abnormal phenomena, viz: its face and the vaccinated arm were covered with impetigo. This child was a mulatto, of a strumous appearance.

Dr. Ramsey, Medical Director at Knoxvillle, Tenn., reported that many cases of spurious vaccination having occurred at that post, a civil physician, of high repute, was employed to obtain a supply of reliable vaccine virus from healthy infants in that city and its environs. Notwithstanding the greatest care was taken, the virus thus obtained produced no effect in some instances, and in others it was followed by erysipelas and other cutaneous eruptions. Dr. Ramsey reports unpleasant abnormal exhibits recently observed to succeed the insertion of real or presumed vaccine virus. "These exhibits are not alone erysipelatous, but are in many instances a nondescript furfurraceous condition of the skin, presenting in flakes from the size of meal particles to that of a fish scale, and a much larger number of instances of rupia—sores of irregular shape and size, penetrating deep in the tissues, and thickening black scales occurring at points remote from, as well as at the point of which the real or presumed vaccine virus had been inserted. In many cases of the erysipelatous exhibits sloughing of the tissues occurred to an enormous extent, even to the destruction of the part for use. * * * These exhibits have been observed in every State of the Confederacy, in every Department from the Potomac to the Mississippi. They have been observed to follow the insertion of virus, which when inserted into other persons was followed progressively by pimple, vesicle, cellular pustule, drying, small in diameter with dark-brown or deep mahogany, but semi-opaque, color; the whole complete in from sixteen to twenty-one days, and regarded by me as regular vaccine disease." * * * * These abnormal exhibits "do not depend on, or proceed from, any quality essentially pertaining to the virus which was used, but result from an epidemical cause, the impress of which is made efficient or active by the co-operation with a virus. The old doctrine of predisposing and exciting causes."

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[*] It is much to be regretted that the reports of Vaccinations in the Confederate Army, including those of Spurious Vaccination, were destroyed by the fire which occurred in Richmond, Va, on the night of its evacuation by the Confederate troops, and that an elaborate paper on Spurious Vaccination, by the writer, was wantonly destroyed by Federal soldiers.

[†] I have observed this on other occasions.

[‡] Of these, two persons had been inoculated with genuine variolous matter in childhood.

[‖] The vaccine crust being used almost exclusively at the South, in consequence of its retaining its properties for a longer period than the died lymph, and furnishing a more abundant supply of virus, will be always understood as the only form of virus alluded to, unless otherwise stated.

[§] This I acknowledged to be entirely theoretical, as I have no facts to prove such a deterioration, and consequent zymosis ever to have taken place.

[¶] The labors of this gentleman in the cause of suffering humanity, whether in the form of friend or foe, entitle him to high rank in the roll of philanthropists.

When the Army of Northern Virginia lay around Fredericksburg, after the first battle at that place, a large number of spurious vaccinations occurred among the soldiers. These appeared to be abnormal results of true vaccinations. Large numbers were sent to the hospital, and many remained in a disabled condition for several weeks, the ulcers showing no disposition to heal. The army was ordered to move northward, and most of the men quitted their beds and joined the ranks. *All these cases got well on the march.* In this instance it was evident that the abnormal results were due to the condition of the systems of the men.

S. E. Habersham, Surgeon in charge of the Second Division of Chimborazo Hospital, reported that many cases of spurious vaccination occurred at that institution. In consequence of the prevalence of small-pox, orders were given by Surgeon-General Moore, to vaccinate the patients whenever the condition of their systems, impaired by disease or wounds, would admit of it. Observing that the virus, with which the hospital was supplied, produced abnormal results, a physician of high respectebility residing in the neighborhood, was employed to procure genuine virus from the arms of healthy infants, for the use of the hospital. The virus thus procurred perfectly normal results in some instances, and abnormal results in others Surgeon Habersham remarks:

> "The character of all the cases which have come under my observation approximate more impetigo sparsa of an aggravated character than any other disease. The disease is evidently constitutional, as a pustule may be produced in many cases simply by the scratch of a pin in other parts of the person. I am by no means satisfied that the disease has originated by the use of *impure virus*, inasmuch as three cases were developed in this hospital as early as December, 1862, in patients who had been vaccinated with virus which in other subjects produced a perfect vaccination with no ulterior evil consequences. It will be seen that many of the foregoing cases were developed in men who stated that they were perfectly healthy up to the time of their vaccination. My experience, however, is that in the cases developed in the hospital the patients were in bad health, and of broken-down constitutions, with a very impoverished condition of blood. Under this impression, vaccination was withheld from such patients until their general health had been restored, when vaccination was practiced without any evil results.
>
> "A close inquiry into the cause and origin of the disease will reveal facts, I am inclined to believe, which will show that the predisposing cause exists in some peculiarly vitiated condition of the vital fluid, and that the exciting cause is the insertion of vaccine virus."

As a strong corroborative evidence of the truth of these opinions, Dr. Habersham states that about this time a considerable supply of cod liver oil was brought in through the blockade, that a liberal supply was sent to Chimborazo Hospital, that he placed the patients suffering from spurious vaccinia upon the use of this valuable assimilative material, and that they all rapidly recovered.

The following reports illustrate some forms of the disease upon which these remarks were based:

> "Case X.—Private W. J. Smith, Company A, Sixtieth Georgia Infantry, aged twenty-two; by occupation a farmer; has suffered from an eruption of the skin for about two months; was never healthy, having suffered from debility for a long time; born of healthy parents; was vaccinated about the middle of January, 1863, in General Hospital, at Danville, by surgeon in charge. Vaccination performed in both arms, on the left first, and about ten days afterwards on the right. Both punctures produced pustules, which healed in about two months, leaving dark cicatrices. He was then returned to duty. About two months afterwards a pustule formed on the upper edge of the cicatrix on the left arm. Eight pustules formed successively around the first secondary pustule (which gradually coalesced into one scab), similar to the eruption of variola confluense.
>
> "Patient admitted into hospital May 27, 1863, presenting an eruption of five pustules on the right arm, and one near the wrist, one two inches below the bend of the elbow, and three above the elbow, which were covered with thick, elevated scabs, from beneath which a saneous and ichorous pus was discharged, similar in character to impetigo sparsa. General health bad. System emaciated and anemic. Treatment—Iodide of potassium internally. General health and character of pustules improving."

In other cases the eruption made its appearance on the lower extremities.

The following report illustrates a class of cases unaccompanied by eruption or evidence of zymosis extending to other parts of the system.

> "Case 1.—June, 1863; Henry H. Burnett, private, Company A, Sixth Georgia Infantry, admitted May 2, 1863, with ulcer on left arm, about two inches long by one inch wide. It was very much elevated above the general surface, and upon it there was a hard, black scab, which was loosely attached at the base, and from all points issued a thin, ichorous discharge. The patient's general health was bad, and he was very anaemic. He states that he was vaccinated in camp on the fifteenth of April, by the Assistant Surgeon (does not remember name) of the Sixth Georgia Regiment, with virus supposed to be good; that his health was bad at the time, just convalescing from an attack of dysentery; that the third day after the operation the arm became very much inflamed from the elbow to the shoulder, which lasted about a week, during

which time, or soon thereafter, the ulcer extended and assumed the size and shape that it presented when admitted to hospital. The patient was put upon the iodide of potassum, gr, x, three times per day, with the syrup of sarsaparilla and generous diet. The arm was poulticed until the scab came away. It presented a cupped appearance, corresponding to the elevated and fungoid base, and has all the characteristics of an indolent and chronic ulcer, which being freely cauterized, improved, and the patient is now convalescent.

"The patient states that he was born of healthy parents, but lost a brother with consumption; that he entered the service on the eighteenth of February, 1862: did not enter the service at the commencement of hostilities because of bad health, which has improved since."

During the latter part of the year 1862, and the early part of 1864, up to the fall of Richmond, the citizens suffered for the want of provisions, from the destruction of supplies by raiding parties, difficulty of transportation, and depreciation of currency. Instances of scurvy occurred among the citizens. At this time cases of spurious vaccinia occurred, of which the following is an illustration:

"CASE 1*.—January, 1863; vaccinated a white woman, who resided on Third street, near the cemetery, and on the same day her adopted child, a girl about six years old. Both were primary vaccinations and from the same virus. The vaccine disease, which appeared on the child about the fifth day, went regularly through its stages. It was, in fact, a perfect vaccination, but in the woman it was quite different. When I examined her arm four days after the operation there was an excrescence, a spongy sore. I told her as it had failed to take, I would vaccinate her from the child at the proper time. About ten days after this I was sent for to treat her arm, which presented an ulcer of an inch in diameter, with incrustations, from which was discharged some healthy pus. She accused me at once of having used impure virus, but the case of the child protected me. Considering the ulcer the result of some vice of system (though I could obtain no evidence from her of this), I treated the case with five-grain doses of iodide of potassium and stimulants, and applied the ointment of the nitrate of mercury dilute to the part, after it had been cleansed by a flaxseed poultice. The sore proved of a very indolent character until the treatment had been used for two weeks, when it began to improve, and finally healed. From her character I inferred she had had syphilis. I vaccinated from the scab of the child without success."

It appears from the foregoing reports that in some cases the pure vaccine virus was absorbed by a system in an unhealthy condition, and produced the normal phenomena of vaccinia; but the sequelæ were abnormal. In some instances latent disease appears to have been developed, in others the system had not sufficient recuperative power to restore the injured part to its former condition, and hence ill-conditioned ulcers showing no disposition to heal were left by the falling scab. In all these cases there was no abnormal *contagious* disease propagated by or originating in vaccine virus.

The resulting vaccinia was perfectly protective; only the sequelæ were abnormal. When the virus was used from these cases, of which the records are not numerous or clear, it produced spurious results. These phenomena appeared to be only the consequence of the resisting or eliminating efforts of the part, in order to guard the system against the introduction of an animal poison. In one instance there may have been an evanescent inflammation, and in another a true zymotic action not producing vaccinia, but an ulcer difficult to heal. In the former case the vital powers were more energetic, or the blood was in a more healthy condition; in the latter these powers were more feeble and the blood was less healthy. Both of these states were due to circumstances of nutrition, exposure, fatigue, moral condition, etc.

Beside these cases others occurred of a far more formidable character.

After the trial of Wirz I published a small volume, entitled: "Researches upon Spurious Vaccination, or the Abnormal Phenomena, accompanying and following Vaccination in the Confederate Army, during the recent Civil War, 1861-1865," in which I examined the charge that the medical officers of the Confederate Army had deliberately poisoned the Federal prisoners with poisonous vaccine matter.

Copies of this work were sent to several of the most prominent Generals and medical officers of the Confederate Army, with the request that they would communicate such facts as were in their possession with reference to the sufferings of the Federal and Confederate prisoners.

The universal testimony was to the effect that the sufferings of the Federal prisoners were due to causes over which the Confederate Government had little or no control, and that the sufferings and mortality amongst the Confederate prisoners confined in Northern prisons were equally great and deplorable.

From this correspondence I select the following letters from Gen. Robert E. Lee and other eminent citizens of the Southern States:

LEXINGTON, Virginia, April 15, 1867.

Dr. Joseph Jones:

Dear Sir—I am much obliged to you for the copy of your "Researches on Spurious Vaccination," which I will place in the library of the Lexington College.

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*Reported by Dr. W. H. Davis, of Richmond, Virginia.

I have read with attention your examination of the charge made by the United States Military Commission, that the Confederate surgeons poisoned the Federal prisoners at Andersonville with vaccine matter.

I believe every one who has investigated the afflictions of the Federal prisoners is of the opinion that they were incident to their condition as prisoners of war, and to the distressed state of the whole Southern country; and I fear they were fully shared by the Confederate prisoners in Federal prisons.

Very respectfully, your obedient servant, R. E. LEE.

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CRAWFORDSVILLE, Georgia, April 9, 1867.

Professor Joseph Jones, M. D.:

My Dear Sir—Your esteemed favor of the third instant was received to-day. The pamphlet came to hand two or three days ago. I am truly obliged to you for both. I have been very much interested indeed with the pamphlet, especially with the matter on pages 13 and 27, inclusive.

With renewed thanks and kindest regards, I remain yours truly,

ALEXANDER H. STEPHENS.

Mr. Alexander H. Stephens, formerly Vice President of the Southern Confederacy, thus alludes to this subject in his great work, "*A Constitutional View of the Late War Between the States,*"

"The condition of those at Andersonville at the time was, indeed, most pitiable and deplorable. A very correct idea of it is given in the report of Dr. Joseph Jones, the very learned and eminent, as well as philanthropic surgeon, who voluntarily devoted months of his time to the alleviation of their maladies and miseries. In speaking of their general condition he says:

"'Surrounded by these depressing agencies, the postponement of the general exchange of prisoners, and the constantly receding hopes of deliverance through the action of their own government, depressed the already desponding spirits, and destroyed those mental and moral energies so necessary for a successful struggle against disease and its agents. Home sickness and disappointment, mental depression and distress attending the daily longings for an apparently hopeless release, appeared to be as potent agencies in the destruction of these prisoners as the physical causes of actual disease.'"

SAVANNAH, Georgia, August 21, 1869.

Joseph Jones, M. D., Secretary Southern Historical Society:

Dear Sir—I have had the honor to receive your letter of the second instant, and thank you cordially for the compliment you pay me, by "submitting" for my criticism your valuable paper on the losses of the Confederate armies in the recent war.

Even if my means of obtaining information on the subject of that paper, so interesting to us, were equal to yours, I could not venture to criticise your work; still less, as the fact is, that I am without knowledge of the subject, or have so little as to justify the above expression—too little to make suggestions to you, or to pretend to offer you information.

Most respectfully, yours truly, J. E. JOHNSTON.

NEW ORLEANS, Louisiana, April 11, 1867.

Dr. Joseph Jones:

Dear Sir—Your letter of the third instant has been received—also the accompanying pamphlet, "On Spurious Vaccination in the Confederate Army," which I will read with pleasure, and for which please receive my thanks.

The charge relative to poisoning Federal prisoners by our surgeons, at Andersonville, I never gave a second thought to, as I believed it to be too absurd and ridiculous; but it is well to have refuted it.

I remain yours, very truly, G. T. BEAUREGARD.

CHARLESTON, April 22.

Joseph Jones, M. D.:

My Dear Sir—Your letter, incorrectly addressed to me at Columbia, reached me only yesterday in Charleston. Your pamphlet came several days ago, and I am very grateful for it, but as I gave my copy to a professional medico, I will thank you for another. I retained the first copy long enough, however, to peruse it, and you will find from the enclosed printed notice, which I prepared editorially for the Charleston Courier, that I had, in some degree, recognized your object in one very important portion of the work. Let us hope that the notice, however inadequate to the merits of your essay, will not be found ungenial. Yours, truly, W. GILMORE SIMMS.

SPURIOUS VACCINATION.

We are indebted to the author, Dr. Joseph Jones, M. D., Professor of Physiology and Pathology in the Medical Department of the University of Nashville, Tennessee, for a copy of an elaborate pamphlet, devoted to this most interesting subject of "Spurious Vaccination," a subject which, during the late war in this country, grew to be one of enormous proportions, as being one of vital interest to the statistics of humanity and mortality in every section. The curious and complicated history of the abnormal phenomena accompanying and following vaccination in the Confederate Army, during the war, and governed—as doubtless it was—by the melancholy condition of the army, under exposure, privation, cold or heat, bad food, crowded hospitals, and the use of salt meat without vegetables; this is the general topic of this valuable pamphlet, which displays a great deal of earnest inquiry, scrupulous thought, and a speculation which seems to be built upon just and plausible premises, and which is enforced by a great body and variety of testimony from eminent medical men of equal reading and experience. But in regard to the medical and surgical value of this work we prefer to have the opinion of medical men, and we have accordingly confided the publication—which covers 136 pages of closely printed octavo—to the hands of an able friend and correspondent, who will probably afford us a just and complete opinion of its facts and theories at a future day.

But there is another point of view in which this pamphlet is to be regarded, and for which we gladly welcome its publication, viz: The Historical. It will be found, in its uniform statement of facts, in its statistics of mortality, relatively among the Federal soldiers and our own, in its very full report of the conditions under which our soldiers were treated—in their sufferings from want, equally of food and medicine—a sufficient answer to those atrocious slanders, by which it was sought to make the Confederate Government and people odious for their misfortunes, as if for crimes, and to place to their account those evils which accrued wholly from the cruel and brutal policy of the Federal Government itself, throughout the progress of the war. In this point of view, as a contribution to the history of the country, this pamphlet merits to be read by every citizen, and to find circulation in every region where it is thought necessary, or proper, that a lie should be knocked on the head as soon as possible. We thank Dr. Jones for our copy of this valuable pamphlet, and counsel its general circulation.

CHARLESTON, South Carolina, 37 Tradd Street, April, 1867.

Professor Joseph Jones, M. D.:

My Dear Doctor—Thanks for the copy of your "Researches upon Spurious Vaccination." Your labors in the department of pathology and hygiene during the war were familiar to us all in Richmond, and the profession at large must be glad to find them in print. I trust your entire labors were not lost among the Surgeon-Generals' documents? Mine were lost, but I still have notes and material which I may make public. * *

Hoping to hear from you shortly, I am, with brotherly and friendly feelings,

Your obedient servant, MIDDLETON MICHEL.

RICHMOND, Virginia, April 5, 1867.

Professor Joseph Jones:

Dear Sir—I beg to acknowledge, with many thanks, the receipt of two numbers of the "Nashville Journal of Medicine and Surgery" and your pamphlet upon "Spurious Vaccination." The last especially was read with great interest, and the profession owes you a debt of gratitude for the careful and masterly investigation you have given the subject.

I received your letter in regard to spurious vaccination, last November, and was anxious to answer it, because I had seen in the army a great many cases, and was one of a committee of investigation ordered by Dr. Guild, and referred to by Dr. ——— in the letter you publish from him; but soon after your letter came, I left the city to be married, and did not get back until it was too late, I supposed, for an answer to reach you in time for your article. My letter, however, would have served only to corroborate what you received from Dr. B. Yours, very respectfully, HUNTER McGUIRE.

FIRST MILITARY DISTRICT, RICHMOND, Virginia, April 3, 1867.

Dear Doctor—Your monograph on spurious vaccination is just received. I have looked over the articles seriatim as they appeared in your journal, with very great interest. At the same time, I am compelled to say, that you have failed to convince me of the correctness of your conclusions. I am prepared to show, and, I think, by clear, convincing evidence, that vaccine virus never conveys any other disease or morbific virus, that it refuses to associate with any other. I am very anxious to complete my paper on this subject, but have been so constantly interrupted that I can only look occasionally, and wistfully, at my unfinished manuscript.

If you had done nothing more than to have written the second section of your monograph, you would be entitled to the everlasting gratitude of every Southerner. There is no vile slander so extensively circulated, and pertinaciously insisted upon by our enemies as that which declares that we starved or otherwise maltreated the prisoners in our hands. This you have ably refuted in the second section. I will feel greatly indebted to you if you will send copies of your monograph to the following gentlemen: Dr. Edward C. Bolton, Poughkeepsie, New York; Dr. Abram Dubois, No. 13 West Eleventh Street, New York; Dr. Elisha Harris, No. 21 West Twelfth Street, New York; Dr. I. M. Minor, No. 7 Upper Gloucester Street, Dorset Square, London.

The last is a native Virginian, and true as steel. I am sure he will be glad to be furnished with the means of refuting the foul slanders where there will be a chance of having an impartial hearing.

Some time since I forwarded to you my paper on spurious vaccination as it occurred in the Confederate Armies, and also abstracts from reports of Confederate surgeons upon the same subject, but have received no acknowledgment from you, and fear my letter may have miscarried. I would regret this very deeply, as I have kept no copy.

You will, therefore, oblige me greatly by replying at your earliest convenience and relieving my anxieties. If the letter has not come to hand, you will please use all endeavors to recover it. Very truly, yours, JAMES BOLTON, M. D.

Dr. Joseph Jones, University of Nashville.

P. S. You need not trouble yourself to send a copy of your paper to Dr. Minor, of London. If you will send me a copy, I will forward it.

WILMINGTON, N. C., July 21, 1867.

Joseph Jones, M. D.:

My Dear Sir—I am under obligations to you for your "Researches upon Spurious Vaccination," which I will make a subject of report with other committee matter at the next annual meeting of our State Society in April.

I am very much pleased with the extensive research which your work exhibits, and think I can see that many spurious vaccinations observed by me, are referable to rational causes, and not much to the method of vaccination.

Spontaneous vaccinia, I am inclined to believe, occurs in this section of North Carolina and we are making every endeavor to collect everything for a complete report. I am now testing some vaccine sent by Dr. Wilson, from a spontaneous vaccine pustule from one of his cattle; Dr. Bolton is engaged in a similar investigation.

If I am not trespassing on your valuable time, I would like to learn your process of inducing spontaneous vaccinia.

Allow me again to express my obligations to you, and believe me,

Very truly, yours, THOMAS F. WOOD.

Our transactions will be completed by the first of August.

THE TENNESSEE MEDICAL SOCIETY—THIRTY-FOURTH ANNUAL MEETING.

IN THE BOARD OF HEALTH ROOMS,
NASHVILLE, APRIL 10, 1867.

The Society met pursuant to adjournment. Dr. Robert Martin, President, in the chair.

AFTERNOON SESSION.

The Society was called to order by the presiding officer, and the various standing and special committees appointed as follows:

On Publication—Drs. J. H. Callendar, Joseph Jones, of Davidson, and D. F. Wright, of Montgomery.

On History of the Society—Drs. J. E. Manlove, W. K. Bowling, of Davidson, and J. W. Richardson, of Rutherford.

On Registration of Births, Deaths, etc., etc.—Drs. J. R. Buist, of Davidson; E. B. Haskins, of Montgomery; Daniel German, of Williamson; B. W. Avent, of Shelby; A. Jackson, of Madison; B. Frazier, of Knox, and S. P. Crawford, of Greene.

On Amendment to Charter—Drs. R. Martin, C. K. Winston and W. A. Cheatham, of Davidson.

Dr. Buist moved that a committee of three be appointed by the Chair to select and recommend as many as eight subjects, assigned to as many suitable writers, who will be requested to prepare a paper on each, to be presented at the next regular meeting; that this committee report at an early day, to the President of the Society, the results of their labors, so that he may be able to notify each appointee. Adopted, and Drs. Buist, Eve and Du Pré appointed as such committee.

The Secretary read a letter from Dr. Lipscomb, of Shelbyville, the President elect, regretting his inability to attend the meeting of the Society, and submitting the following resolutions for its consideration:

Resolved, That although the elaborate researches of Prof. Joseph Jones may have failed to define conclusively the origin of spurious vaccination, they have not failed to elucidate the points of vital importance intimately connected with vaccination.

Resolved, That Prof. Jones has succeeded in collecting a sufficient number of facts to overthrow the long-accredited dogma, that secondary syphilis is incommunicable by inoculation.

Resolved, That the facts collected forcibly illustrate the importance of using no vaccine virus, except that obtained from perfectly healthy subjects, as well as manifest the propriety of omitting the vaccination of the unhealthy.

Resolved, That for the zeal, industry and learning devoted to this subject, by which so many important facts have been presented, and various points elucidated, the author is entitled to the thanks of the profession.

The resolutions were unanimously adopted.

SECTION III—THE EMPLOYMENT OF MATTER FROM PUSTULES OR ULCERS WHICH HAD DEVIATED FROM THE REGULAR AND NORMAL COURSE OF DEVELOPMENT IN THE VACCINE VESICLE;

SUCH DEVIATION OR IMPERFECTION IN THE VACCINE DISEASE AND PUSTULE BEING DUE MAINLY TO PREVIOUS VACCINATION, AND THE EXISTENCE OF SOME ERUPTIVE DISEASE AT THE TIME OF VACCINATION. OR, IN OTHER WORDS, THE EMPLOYMENT OF MATTER FROM PATIENTS WHO HAD BEEN PREVIOUSLY VACCINATED, AND WHO WERE PARTIALLY PROTECTED, OR WHO WERE AFFECTED WITH SOME SKIN DISEASE AT THE TIME OF THE INSERTION OF THE VACCINE VIRUS.

PROF. PAUL F. EVE, M. D., ON SPURIOUS VACCINATION—DR. R. D. HAMILTON, OF CHATTANOOGA, ON SPURIOUS VACCINATION AMONGST THE CONFEDERATE FORCES SERVING IN EAST TENNESSEE—INVESTIGATIONS OF DR. EDWARD JENNER, ON THE VARIETIES AND MODIFICATIONS OF THE VACCINE DISEASE—ANSWER TO DR. JENNER'S INQUIRIES, BY THE RECTOR OF LACKHAMSTEAD—OBSERVATIONS OF DR. JAMES DAVIS, OF COLUMBIA, SOUTH CAROLINA, ON THE VACCINE AND VARIOLOID DISEASE—EXAMINATION OF THE DOCTRINE OF JOHN HUNTER, ON DISEASED ACTIONS AS BEING INCOMPATIBLE WITH EACH OTHER—RELATIONS OF THE VACCINE DISEASE TO MEASLES AND OTHER DISEASES, WITH THE OBSERVATIONS OF NUMEROUS AUTHORS—RELATIONS OF CHICKEN-POX TO SMALL-POX—HISTORY AND PHENOMENA OF CHICKEN-POX (VARICELLA)—DIFFERENTIAL DIAGNOSIS BETWEEN VARIOLOID AND VARICELLA.

Whilst it might admit of debate, whether pure vaccine virus, obtained from persons never before vaccinated, and who manifested all the phenomena of the disease, and especially the characteristic febrile phenomena ever becomes deteriorated or possessed of deleterious properties in its passage through numerous human bodies, not suffering with such a contagious disease as syphilis; on the other hand, it cannot be denied that the power of vaccination has been impaired to a lamentable and almost incalculable extent by a succession of imperfect vaccinations; and especially by the employment of matter from those who have been previously vaccinated, or who have suffered from small-pox previous to vaccination.

Vaccination may be rendered imperfect by the development of febrile and other diseased states after the introduction of the virus into the system, arising from the action of cold, or some cause producing constitutional disturbances differing essentially from the febrile phenomena which mark the progress and perfection of the vaccine disease, as well as by its imperfect and altered course in those who are partially protected by previous vaccination.

In the isolated condition of the Southern Confederacy, cut off from the surrounding world, and denied even vaccine matter, as "*contraband of war;*" with the necessity of turning out the entire fighting population to repel invasion, and with the necessity of employing all the available medical aid, good, bad and indifferent; and with the progressive increase of small-pox, it is not strange that the process of vaccination was not as carefully watched and tested as it should have been; and that consequently much imperfect material circulated as *vaccine matter*, which not only afforded little or no protection against small-pox, but also proved positively deleterious.

My friend, Professor Paul F. Eve, M. D., has recorded in his discussion of certain questions relative to the health of the late Southern Army, interesting observations upon spurious vaccination; and it will be seen, from the following extracts, that this distinguished surgeon inclines to the belief that the abnormal manifestations of the vaccine disease may be due, in a great measure, to the alteration of the matter in consequence of its passing through a long succession of human subjects, and in consequence of the co-existence of various diseases:

"The scab used in Atlanta, which did so much mischief, was soft, porous and spongy, of a yellowish-brown color, resembling concrete, impissated pus. It was not a small, hard, compact, translucent substance, like dried compressed glue, of dark-mahogany color, requiring, as the genuine scab does, considerable effort to break it; neither did it present the clear, even, vitreous aspect when fractured, but was bulky, irregular and crumbling. In every instance, wherein vaccination was attempted with it, premature effects were developed. No proper period of incubation, nor papular or vesicular eruption was observed, but in a few days, even as early as the second, inflammation had set up, and by the fourth or fifth day, sores were produced, covered by a thick, dirty crust, with an ichorous discharge. Soon an ill-constituted ulcer, with perpendicular edges, ensued, extending through the dermoid to the cellular and muscular tissues, and involving the neighboring lymphatics. The cutaneous surface suffered chiefly, presenting large, irritable, very dark-colored and scabby ulcers. Sometimes there was one, in other cases several, not on the extremity only into which the matter had been inserted, but on the others, and sometimes on the body. These cases were greatly aggravated by complications with erysipelas, scorbutis, syphilis, itch, etc. I believe we had no death from uncomplicated case of spurious vaccination, though forty to fifty patients were treated in this hospital. * * While every deviation from the regular development of the vaccine disease may be considered spurious, we yet understand now by that term, a pretty well defined, certainly a peculiar, if not a specific affection, which we have already attempted to describe. * *

Intimately connected with the nature of spurieus vaccination, is involved the question of its being simply a local affection, or constitutional disease. To what are its symptoms due; to a virus, or do they arise from cachexia? I am free to confess that the investigation of this subject has caused me to reverse the opinion that the effects of impure vaccination are alone to be attributed to the bad condition of the patient's system, and did not depend upon anything special or specific. From repeated experiments, it is well ascertained that laudable pus when inserted into a healthy person is inocuous, and should it be used in even a decomposing or concrete state, will not excite certain uniform and peculiar results. Impure blood, peculiarity of constitution, indulgencies, epidemic influence, etc., etc., will account, I know, for many local disturbances, but not for the origin of spurious vaccination. In every case it is the result of vaccination with impure virus, by careless or inexperienced persons. In reference to the nature of this impurity, there is good reason to believe that it results from a perversion or modification in the vaccine vesicle. We know heat destroys vaccine, as well as variolous virus, and it may be that excessive inflammatory action changes the genuine vaccine matter into the spurious. Or it may be this virus affected by another disease, or the bad state of the system, or becoming nearly effete itself, by passing through numerous systems produces a disease only resembling the true vaccine. The difficulty of developing genuine vaccination in one once impressed by the spurious, shows plainly the connection between the two."—*The Nashville Journal of Medicine and Surgery*, New Series; vol. 1, 1866, pp. 21-28

It will be seen from the following interesting communication that Dr. Hamilton, of Chattanooga, who enjoyed ample opportunities for the investigation of the accidents following vaccination in the Confederate Army, attributes much of the spurious vaccination to the careless use of matter from imperfect vesicles or sores.

CHATTANOOGA, January 15, 1866.

Prof. Joseph Jones:

Dear Sir—Your note of the fifth was received some time since. Sickness, absence from home, and professional duties have prevented an earlier reply, which I much regret, but cannot remedy.

In regard to the subjects named, I fear I can afford but little information worthy of your consideration.

Of what is termed as "spurious vaccination," I saw many instances during my services as Surgeon in the army; and while in charge of the General Hospital at Strawberry Plains, East Tennessee, I was directed from the Surgeon General's Office, to make a statistical report of all cases which had come to my knowledge. In obedience to this order, I had collected notes of many cases, but shortly after came the evacuation of East Tennessee, and my engagement in a different field of labor, so that the report was not made, and most of the notes which I had accumulated were "lost or destroyed by unavoidable accident."

From the few notes I have on hand, and from such facts as I can recall to memory, I give you herewith the general results.

All the cases, with a few exceptions, of "spurious vaccination," which came under my observation during the war, were reducible to one of the three following named classes:

1. A single suppurating ulcer at the point of vaccination,
2. General eruptions, sometimes single, sometimes in patches involving a considerable extent of surface, appearing during the existence of the original ulcer, or after it had healed.
3. General eruptions attended by suppuration of the lymphatic glands.

To what extent these different forms may be regarded as separate stages of the same development, I am not prepared to say, and I believe that no connection exists between them in such a sense. There certainly was no discoverable progression through the different conditions, such as is seen in some diseases.

It is evident that the result of any vaccination or inoculation must depend upon one or both of the following causes:

1. Upon the kind of virus used.
2. Upon the condition of the patient.

If vaccine virus is not used in any particular instance the result will be useless and perhaps hurtful to the patient. I am forced to the conclusion that a large majority of the cases of "spurious vaccination," which came under my observation during the war, were such because of the spuriousness of the virus used. If, by supposed vaccination, a "sore" was produced on the arm, the virus was supposed to be "taking," and straightway the matter was put into other arms, and other "sores" produced, when, on examination it would be found not one of the arms gave evidence of vaccination. The pustules did not possess the characteristics of true vaccine, either in their progress or in their results. The proper scar was not left by them, nor the usual protection from variola afforred. A portion of liquid or encrusted pus, or of epithelium, was inserted in the arm, and the patient was presumed to be vaccinated. In some instances true vaccine virus was used on persons whose systems were protected by previous vaccination, and the matter from the resulting pustules when used by others, became a source of evil. Soldiers practiced upon themselves from the arm of one of their number, whence came a long train of evil results.

But there were instances where portions of the same scab produced in some persons the true vaccine pustule, and in others only the spurious eruption, and the explanation must be found in the condition of the patient. Just what this peculiar condition is, or what its causes are, we know not. The questions concerning the influence of army life on the physical, mental and moral condition of men recently taken from the walks of civil life, are many and various, and as yet, I believe most of us are only "guessing" at answers. Every medical officer remembers how fatal among soldiers, at times, were complaints which are ordinarily remediable, and that, too, when, at the time of the appearance of the disease, the soldiers were apparently in robust health. It will also be remembered how very few instances occurred of what would be regarded as types of any one disease, while at the same time a large number of cases would be found. Nearly all were more or less modified, and some so completely as almost to lose their identity. But this subject is too extensive for discussion at this time.

In regard to the transmission of syphilitic poison through the process of vaccination, I can recall to mind a few instances, where I feel positively certain that secondary syphilitic, eruptions existed, and the patients were equally in their expressed belief that the symptoms came from vaccination. Such cases were always diagnosticated as syphilitic, and treated and relieved as such. My experience leads me to put so little faith in the assertions of persons affected with any venereal disease, on this subject, that I have arrived at no rersonable conclusion, and I can only say with the poet—begging pardon for so unpoetic a connection—"Though I canna see, I guess and fear."

To sum up then, in a few words. First—It is my belief that most of the cases of so-called spurious vaccinacion resulted from the fact that vaccine virus was not used, and therefore no vaccination, in the proper sense of the term took, place. Secondly—The condition of the system, affected by atmospheric influence, or the kind of life led by soldiers, or by what you will, so modified the action of the virus as to produce morbid results.

I regret that circumstances prevent a more extended consideration of the subject touched on in this letter, such as their importance demands, and I rejoice to learn that you are preparing a Monograph on the same, and I shall look forward with much interest for its appearance in print. Very truly, yours, R. D. HAMILTON.

Dr Jenner, in the beginning of his inquiries, felt the propriety of watchfulness; and at an early day he distinctly announced that it was possible to propagate an affection by vaccination conveying different degrees of security, according as that affection approached to, or receded from, the full and perfect standard; he also clearly stated that the course of the vaccine pustule might be so modified as to deprive it of its efficacy, and that inoculation from such a source might communicate an inefficient protection, and that all who were thus vaccinated were more or less liable to subsequent small-pox. He still further maintained that fluid taken from a genuine pustule in its far advanced stages, is capable of producing varieties which will be permanent if we continue to employ it. Dr. Jenner attached great importance to the condition of the skin at the time of the insertion of the virus.

In his tract "On the Varieties and Modifications, of the Vaccine Pustule occasioned by an herpetic state of the skin," he says, "I shall here just observe that the most careful testimonies now lie before me supporting my opinion that the herpetic, and some other irritative eruptions, are capable of rendering variolous inoculation imperfect, as well as the vaccine."

One of the entries in his Journal is to the following effect: "Inoculated Lady C. F. a second time. It is evident that *that* affection of the skin called red-gum, deadens the effects of the vaccine virus. This infant was covered with it when inoculated four days ago. The same thing happened to Mrs. D's. infant."

In a letter to Mr. Dunning, dated Berkely, December 23, 1804, Dr. Jenner says:

> "There may be peculiarities of constitution favorable to this phenomenon. My opinion still is, that the grand interference is from the agency of the herpes, in some form or another; for I have discovered that it is very Proteus, assuming, as it thinks fit, the character of the greater part of the irritative eruptions that assail us. I shall have much to say on this disease one of these days."

The reported failures of vaccination, and the occurrence of several violent variolous epidemics in different parts of the country, induced him to endeavor to rouse the attention of professional men to those points, in the practice of vaccination, which he deemed essential to its success. With such intentions he printed a circular letter early in 1821, which was sent to most of the respectable medical men in England; in it he directed their observation to the three following questions:

> "First. Whether the vaccine vesicle goes through its course with the same regularity when the skin is under the influence of any herpetic or eruptive disease, as when it is free from such affections; secondly, whether the existence of such eruptive diseases causes any resistance to the due action of vaccine lymph, when inserted into the arms; thirdly, whether cases of small-pox, after vaccination had occurred to the observer, and if so, whether such occurrences could be ascribed to any deviation in the progress of the vaccine pustule, in consequence of the existence of herpetic or other eruptions at the time of vaccination."—*The Life of Edward Jenner, M. D., L.L. D., F. R. S., etc., by John Baron, M. D., vol. 2, p. 272.*

The answer to these inquiries, by the rector of Leckhamstead, contains facts of such value in their bearing upon this portion of the subject, that we are induced to reproduce it entire:

LECKHAMSTEAD, Near Buckingham, June 29, 1820.

Edward Jenner, M. D.:

Dear Sir—Your letter did not reach Buckingham till June 23, though dated the twelfth. The object of inquiry appears to be the extent to which cutaneous diseases reject or modify the vaccine virus, so as to render the efficacy and security doubtful. I have looked over a number of copies of communications to Dr. Harvey, and will with great pleasure send you the transcripts of the interference of variolous and vaccine infection, and the superceding power of the latter if applied in time, six of which took place at Old Stratford, in 1816, among the children of one family, being the whole time under the same roof. The distress and alarm at the time were extremely great, as the inhabitants were recovering from the measles when the small-pox broke out. The anxiety of the parents was such that I was induced, contrary to my own opinion, to vaccinate several where the fever of measles had not completely subsided; the consequence of which was nothing more than that the vaccine virus lay dormant in its cell till the field was clear, and came into action two or three days later; but afterwards proceeded in as regular and decided a manner as in constitutions which were not previously engaged.

I discovered at a very early period that the itch was not an impediment; as to the shingles, I cannot speak. The grand rejecting agent in children is the tooth-rash, or, as it is here commonly called, the red-gum, especially while it continues bright and active. Dr. William Cleaver (when Bishop of Chester) promoted an extensive variolous inoculation in his diocese. Some years after he asked me if I could account for the very frequent failure of communicating the affection to young children. I told him that it applied equally to the vaccine; though frequently, if the virus was fresh and active, it would be suspended in its career for a time only, but push forward with success at last.

I beg to assure you, sir, that nothing I have met with has, in the slightest degree, shaken my faith in the vaccine. I have several children, the eldest sixteen, all vaccinated by myself; and of 14,305, all within a few miles of this place, I have never heard of a single fatal disappointment; and of only two or three cases of modified, or what I should feel inclined to call superficial, or cutaneous small-pox. As to remote or deriative diseases, I know of no such thing fairly to be ascribed to the cow-pox: I have ample means of knowing if such a thing had taken place, as the people of my two parishes, and many in the neighborhood, are, somehow or other, continually coming under my consideration for medical assistance. My communications of late years have been to Dr. Harvey, according to the directions of the National Establishment; but I have met with no demand for inoculation since February, 1820, simply from the absence of any stimulating alarm. I am, dear sir, with the highest respect, your most obedient, humble servant,

T. T. A. REED, Rector of Leckhamstead.

Mr. Reed had, in 1806, printed and distributed a tract for the encouragement of those who entertained any doubt respecting the efficacy of vaccine inoculation; and distinguished himself as an ardent and successful promoter of vaccination. His testimony, therefore, is of great value.

Dr. Jenner maintained to the last hour of his life, that any cutaneous disease, however slight in appearance, was capable of interfering with the regular course of the cow-pox, and of preventing it from exercising its full protecting influence; and his directions for obviating any deterioration of the virus, regarded first, the character of the pustule itself, the time and quality of the lymph taken for inoculation, and all other circumstances that might go to affect the complete progress of the disorder. Thus he maintained that the vaccine fluid should be taken, for the purpose of inoculation, at an early period of the formation of the vesicle, and before the appearance of the areola; and he insisted that the pustule, when excited, should be permitted to go through all its stages in an uninterrupted manner, and if any deviations appeared in its progress, he always forbade the employment of virus from such a pustule for further vaccinations.

Dr. Waterhouse, in a letter to Dr. Mitchell, dated Cambridge, September 26, 1801, says: "Yesterday I received a letter from Dr. Jenner, one paragraph of which I must transcribe, because it contains the *golden rule of vaccination*, viz: 'I don't care what British laws the Americans discard, so that they stick to this—*never to take the virus from a vaccine pustule for the purpose of inoculation, after the efflorescence is formed around it.* I wish this efflorescence to be considered as a sacred boundary, over which the lancet should never pass." *Med. Repository, N. Y.*, vol. 5, p. 236.

Every deviation, from whatever cause it may have arisen, was considered by Jenner of the greatest moment; and as has been fully shown by the learned author of his life, in all his published works, as well as in every private communication, he never failed to express his deep sense of the importance of the most scrupulous attention to that part of the subject; and to the last he felt that, had his admonitions been received as they ought, had the phenomena connected with vaccine inoculation, been studied by all who conducted the practice, a large proportion of the failures would have been avoided.

The following important and interesting communication, published about forty-five years ago, confirms, in a striking manner, the correctness and great value of the laws laid down by Jenner, with reference to the relations of the vaccine disease to cutaneous affections:

OBSERVATIONS ON THE VACCINE AND VARIOLOID DISEASES. COMMUNICATED BY JAMES DAVIS, M. D., OF SOUTH CAROLINA.

I offer you the following communication, not only because it seems to corroborate the observations of Dr. Jenner and others, that the simultaneous existence of cutaneous diseases, with the vaccine-pox, has a tendency to vitiate the virus of the latter disease, and render it unfit for communicating the true kine-pock; but, moreover, because it would appear that the vaccine matter is liable, from this circumstance, to be converted into a virus of a totally different character. * * *

I extract the following case from my note book:

On the twenty-ninth of June, 1814, I vaccinated Master James D. Montgomery, æt. eighteen months, son of Dr. B. R. Montgomery, Professor of Moral Philosophy, etc., in the South Carolina College, together with six other healthy children. I had obtained the matter that I made use of from Dr. Smith, of Baltimore. James D. Montgomery had been laboring under a cutaneous disease (the strophulus interlictus of Willan) for about three months. It had resisted every remedy which I had prescribed for it, and by this time had literally spread over the whole surface, so as to render it difficult to find a sound spot on the arm large enough for making the insertion. I should have been deterred from vaccinating in such a case, but for a remark of Dr. Jenner, viz.: "That vaccination, although not very certain to take in cases of cutaneous eruption, yet, when it did take, it was curative of the cutaneous disorder." Upon this information I recommended it to Dr. Montgomery, who readily acceded to the experiment. The vaccine failed to take effect in every one of the cases, except in that of J. D. Montgomery; and in his case it was really gratifying and delightful to observe the effect of it on the cutaneous disease. As the vaccine pock advanced, the affection of the skin disappeared, and that in a very exact proportion to each other; so that, by the time the pock was mature, the cutaneous disorder had entirely gone off. From fifteen to twenty-five days after the kine-pock had been in its full course, he was afflicted with two abscesses, one on his back and one on his breast, which discharged from half an ounce to an ounce of laudable pus; since which time he has remained in sound and perfect health.

His pock proved to be anomalous, and whether it were sufficient to protect his system against the small-pox has not since been tested. But from the constitutional symptoms which I attentively observed, I am very much inclined to believe that as to himself it was effectual.

The virus manifested no signs of having taken effect until the eighth day, when the small inflamed point at the puncture first appeared.

The areola did not progress from day to day with regularity, nor was it at any time sufficiently circumscribed, having some radii considerably longer than others. Its color was a coarse red, instead of that beautiful fine blush which the genuine vaccine generally exhibits.

The pock, although of ordinary size, and of a concave surface, was destitute of that cordon of bead-like vesicles, which form around the corona of the true kine-pock It was peculiarly dry, insomuch that it was difficult to obtain from it as much lymph as would serve for further vaccination.

Four healthy children (white and black), of the family of Dr. E. D Smith, Professor of Chemistry, etc., were vaccinated from this pustule. I had expressed an opinion, that although I believed the constitution of little Master Montgomery was secured against the small-pox, that, nevertheless, I doubted of the efficacy of the matter of his pustule to communicate the true disease. As matter, however, was hard to be obtained, and as it was conceived no danger could result from it, the doctor determined on making the trial. It failed to produce any effect whatever on all, except on one of the doctor's own children. In this case the puncture began to inflame within the first fourteen hours. The inflammation spread rapidly, accompanied with innumerable papulous eruptions over the inflamed surface, exuding a profuse quantity of gelatinous matter. It continued to spread for about thirty hours, assuming in its progress rather a formidable appearance, and exciting a good deal of alarm, until it occupied a space longer than five or six areolas of true pock; extending over the one more longitudinally than laterally. Aperients were administered, and the topical affection fomented with a decoction of chamomile flowers, and in about forty-eight hours it had totally disappeared, having exhibited no sign whatever of anything like a pock. There was no constitutional disturbance accompanying the affection. The child remained in perfect health, and has undergone the kine-pock by a subsequent vaccination.

This case evinces two facts in a clear and decided manner, to-wit: that the vaccine disease is capable of effecting the cure of certain inveterate diseases of the skin; and that certain diseases of the skin may exert an influence over the vaccine matter, as not only to vitiate and render it unfit for communicating the true kine-pock, but also absolutely to change and convert it into a poison of a new and unknown character Two facts of great practical importance, and which, perhaps, deserves more investigation and scrutiny, than they have hitherto received.

The influence of kine-pock over cutaneous disorders is an old remark; and the influence of diseases of the skin in vitiating the matter of the kine-pock, and rendering it unfit for communicating the true pock, is equally old. But its liability to be converted into a poison of a different nature, productive of singular and anomalous affections, in consequence of being blended with certain cutaneous disorders, is a subject which has not hitherto attracted as much attention as it merits. In this instance, the cutaneous disease of Master Montgomery obviously occasioned a conversion of the vaccine matter into a new kind of virus, producing a new and singular affection. It is true it proved to be a mere topical affection, and terminated without any serious consequences; but, as the vaccine matter is liable to be changed by one form of cutaneous disease, is it not reasonable to conclude that it may also be changed by others? And, although, in this particular case, it was changed into comparatively an inocuous virus, have we any evidence, that in blending with some others of the multifarious affections of the skin, incident to mankind, it may not become converted into a virus of deleterious and destructive operation?

All this, however, indicates nothing against the utility and importance of *genuine* vaccination, but only shows how important it is that it should be practiced with a care, circumspection, and skill, with which the prevailing custom of our country at present is utterly incompatible; and until there shall be a reform effected in this respect, it will be in vain to look for the full extent of those beneficial results to mankind which the kine-pock is unquestionably calculated to afford.

The attainment of these results in strict conformity with the laws of our condition in the attainment of every other great and important good, is beset with difficulties; nevertheless, we have no reason to suppose that these difficulties are insuperable. Every year brings to light some new facts, which enable us to approach nearer and nearer to the attainment of the desired object. And as one principal obstacle to the improvement of our knowledge of this subject has been the apathy, indifference, and even levity, with which it has been received by a great majority of the community; so, when, perhaps, from severe afflictions and scourges, or from any other cause, this supineness and indifference shall be removed; then the march of improvement will be rapidly accelerated, and great and permanent advantages will be the happy result.

Would it not be a wise precaution, and worthy of legislative provisions, to impose a penalty on any one who should communicate the vaccine disease from an unhealthy subject?—*The American Medical Recorder of Original Papers and Intelligence in Medicine and Surgery*, conducted by John Eberle, M. D., Philadelphia, and H. W. Ducachet, M. D., New York, vol. 5, 1822—pp. 208-272.

The power of the vaccine virus to relieve diseases of the skin, can only depend upon its absorption into the blood, and its effects upon the entire system; and facts are now wanting to show by actual manifestations of the local disease in other parts of the system not inoculated with the virus, that the entire system as well as the skin is brought under the action of this poison.

Dr. Denby reported the case of Henry Freeman, a lad of twelve years of age, who was vaccinated in the left arm by the usual mode. The vesicle was marked by the appropriate progressive character of successful inoculation. It happened that on the same day on which he was vaccinated (five hours subsequent to that process,) an incised wound was accidently inflicted on his right knee; which wound, for two or three days promised union by the first intention. On the fourth or fifth day, however, an increase of pain was felt in the knee, with throbbing and heat about the edges of the wound; and, on inspection, some slight papulae, to the number of ten or thirteen, were observed surrounding it. These appearances were yet referred to a common cause. On the eighth day, their peculiar and regular form imparted a conviction that they were true vaccine vesicles, which they proved to be by their progress and maturation.—*London Med. Press*, April, 1825.

As far as our knowledge extends, the records of Medicine, are singularly barren of critical observations upon the phenomena manifested by man, when acted upon, by two or more diseases at the same time. This imperfection of knowledge results not only from the complexity of the phenomena, and the difficulties of the investigation, but also from the comparatively infrequent occurrence of two or more contagious diseases, at the same time, in the same household, and in the same individual.

Every fact illustrating the relations ot the vaccine disease, to other diseases arising simultaneously in the samei ndividual, is of importance in the light which it throws upon the modifications of the vaccine disease, and upon the question of *the possibility of transmitting various contagious diseases through the medium of vaccine virus.*

The following tacts and observations by various writers, bearing upon these questions, which we have gathered up atter some research, are presented under this division of our subject, to which they naturally belong, rather for the purpose of exciting and aiding farther investigation, than as full and complete investigations upon which definite and uncontrovertible principles may be founded. I have myself conducted extended investigations upon the mutual relations, of various concurrent diseases, as malarial fever, typhoid fever, pneumonia, cerebro-spinal meningitis, hospital gangrene and pyæmia, the results of which it would be impossible to present at the present time, although related to the subject now under discussion; and I shall present those facts which relate chiefly to the relations of small-pox and the vaccine disease to several of the Exanthemata.

If we accept without reserve the doctrine of John Hunter, that "No two actions can take place in the same constitution or in the same part, at one and the same time; no two different fevers can exist in the same constitution, no two local diseases in the same part, at the same time;" (*Works of John Hunter*, edited by James F. Palmer, London, 1837, vol. 2, Treatise on the Venereal Disease, p. 132); the question of the modification ofthe vaccine disease by concurrent diseases, as well as the possibility of the transmission of contagious diseases through the medium of the vaccine virus is definitely settled in the negetive. The unreserved assent to such a doctrine as this, is wholly incompatible with the admission of the possibility of transmitting such a disease as syphilis through the medium of the matter produced by a distinct disease, different in its mode of origin, constitutional action, symptoms and progress.

Even the renowned author of this doctrin, appears to have experienced difficulties, when he attempted to apply it universally. The engrafting of other diseases upon the systems of those who were laboring under constitutional syphilis, and scurvy, as well as the occasional occurrence of these two diseased states in the same individual, presented at the outstep difficulties to the mind of John Hunter, which he attempted to remove by argument. The mode, as well as the facts, by which Hunter supported his doctrine are worthy of full consideration, in this connection, as gathered from various portions of his works.

> "*Of diseased actions, as being incompatible with each other.*—As I reckon every operation in the body an action, whether universal or partial, it appears to me beyond a doubt that no two actions can take place in the same constitution, nor in the same part, at one and the same time; the operations of the body are similar in this respect to actions or motions in common matter. It naturally results from this principle that no two different fevers can exist in the same constitution, nor two local disease in the same part. There are many local diseases which have dispositions totally different, but, having very similar appearances, have been supposed by some to be one sort of disease, by others to be of a different kind, and by others again a compound of two diseases. Thus the venereal disease, when it attacks the skin, is very similar to those diseases which are vulgarly called scorbutic and *vice versa*. These, therefore, are often supposed to be mixed, and to exist in the same part. Thus we hear of a pocky-scurvy, a pocky-itch, rheumatic-gout, etc., which names, according to my principle, imply a union that cannot possibly exist.

"It has been considered as contradictory to this opinion that a patient might have scrofula, scurvy, venereal disease, small-pox, etc., at the same time. All of this is indeed possible; but then no two of them can exist in the same part of the body at the same time; but before one of them can occupy the places of another, that other must be first destroyed, or it may be superseded for a time, and may afterwards return.

"When a constitution is susceptible of any one disease, this does not hinder it from being also susceptible of others. I can conceive it possible that a man may be very susceptible of every disease incident to the human body, although it is not probable; for I should believe that one susceptibility is in some degree incompatible with another, in a manner similar to the incompatibility between different actions, though not of so strict a kind.

"A man may have the lues and the small-pox at the same time; that is, parts of his body may be contaminated by the venereal poison, the small-pox may at the same time take place, and both diseases may appear together, but still not in the same part.

"In two eruptive diseases, when both are necessarily the consequence of fevers, and where both naturally appear after the fever nearly at the same distance of time, it would be impossible for the two to have their respective eruptions, even in different parts, because it is impossible that the two preceding fevers should be coexistent.

"From this principle I think I may fairly put the following queries: Do not the failure of inoculation, and the power of resisting many infections, arise from the existence of some other disease at that time in the body, which is therefore incapable of another action?

"Does not the great difference in the time, from the application of the cause to the appearance of the disease, in many cases, depend upon the same principle? For instance, a person is inoculated, and the puncture does not inflame for fourteen days, cases of which I have seen. Is not this deviation from the natural progress of the disease to be attributed to another disease in the constitution at the time of inoculation? Does not the cure of some diseases depend upon the same principle?—as, e. g., the suspension or cure of a gonorrhœa by a fever.

"Let me illustrate this principle still further by one of many cases which have come under my own observation. On Thursday, the sixteenth of May, 1775, I inoculated a gentleman's child, and it was observed that I made pretty large punctures. On the Sunday following, viz., the nineteenth, he appeared to have received the infection, a small inflammation or redness appearing around each puncture and a small tumor. On the twentieth and twenty-first the child was feverish; but I declared it was not the variolous fever, as the inflammation had not at all advanced since the nineteenth. On the twenty-second a considerable eruption appeared, which was evidently the measles, and the sores on the arms appeared to go back, becoming less inflamed.

"On the twenty-third he was very full of the measles; but the punctures on the arms were in the same state as on the preceding day. On the twenty-fifth the measles began to disappear. On the twenty-sixth and twenty-seventh the punctures began again to look a little red. On the twenty-ninth the inflammation increased, and there was a little matter formed. On the thirtieth he was seized with fever. The small-pox appeared at the regular time, went through its usual course and terminated favorably." (Vol. 3, Treatise on the Blood, Inflammation and Gunshot Wounds—pp. 3-5.

"*All diseased actions are simple.*—A disposition of one kind may and shall exist in a part or whole, while an action of another kind is going on; and when the action ceases, the disposition, or dormant action, if we may be allowed to call it so, shall then come into action. * *

"Two children were inoculated for the small-pox. Their arms inflamed, but about the third or fourth day from the inoculation symptoms of fever arose, and the measles appeared, and went through their progress as usual. During this time the inflammation in the arm was arrested; but when the measles were completely gone, the small-pox took place, and went through its progress.

"Here a disposition for the measles had taken hold of the body, but although it had done that previously to the small-pox, yet it was not in such a way as stopped the progress of the small-pox. The small-pox matter was capable of contaminating, and produced inflammation, which went to a certain length, but the moment the measles changed their disposition into action, as the two actions could not go together, the action of the small-pox was suspended till the measles had gone through its action, and the moment the constitution got free of this, the small-pox began to act again.

"A lady of rank was inoculated by Mr. Sutton. A few days after a fever came on, of the languid or putrid kind, but without any eruption, except a few petechiæ on the breast; she went through the process of a low fever, and afterwards the small-pox com-
; yet when the pustules matured they spread and were very large; also a differ-
eruptions succeeded so that thirty days passed before the skin was clear of the

"These cases show that but one mode of action can take place at the same time; yet I could conceive that two actions might produce a third one, which might have been a new poison, as the last case in some measure seems to show." (*Vol.* 1, *Principles of Surgery*, pp. 312-313.)

Dr. Joseph Adams, in his valuable Observations on Morbid Poisons, Chronic and Acute (London, 2d Ed., 1807,), advocated the doctrine of Hunter, that "Two actions cannot be carried on at the same time, or in the same constitution. And recorded in his work the following observations to sustain this proposition:

"Though the law was entirely overlooked till Mr. Hunter's time, yet it is now as well ascertained as any other in pathology. It is worth remarking, that in all the epidemics described by Sydenham, in which small-pox and measles raged at the same season, he gives no hint of there ever appearing at the same time in the same person Dierembroek, indeed, mentions a solitary instance in which the two diseases took place at the same time. His son remarks on the passage, that he never met with a similar instance more than twice in his own practice. Dierembroek's account is somewhat confused. It should be remarked, too, that measles was at that period not so distinctly marked as in later times, and that with the small-pox and other exanthemata, an unusual efflorescence, which may be mistaken for measles is not uncommon We have, however, two cases given us by that close observer, Dr. Russell (*Medical and Chirurgical Transactions*, vol. 2, p. 90), which from the reputation of the author, deserves particular notice. The series and order of symptoms are traced with such accuracy, as not only to place the fact beyond a doubt, but to enable us to make remarks without conjectures, or with only such as every reader will see are admissible.

"We shall first observe, that when in the ill-built and crowded city of Aleppo, small-pox and measles were at the same time epidemic for three months together, only two such cases occurred. In both these cases, the measles were of a formidable kind. It is now established, that if measles do not produce their full action, they sometimes occur a second time. (*See Dr. Willan's Diseases of London*, p. 207.) It would be a curious inquiry, if there were chance that it could be satisfied, to learn whether, on a future epidemic, these children took the measles again. However, those who know how few laws in pathology are without any exception, will only be surprised that this should so rarely occur.

"Dr. Settsom (Mem. of Med. Society, vol. 4, p. 288), relates the history of a family, consisting of the parents, eight children, and three servants, among whom scarlatina and measles appeared about the same time. Some had measles first, others scarlatina. All the latter, and as many as had gone through them before, had measles. In consequence of this succession, adds the Doctor, the disease continued in the family for two months, which probably might have terminated in as many weeks; but no person had the two diseases at the same time, so far, at least, as could be ascertained by the symptoms!"

The industrious De Haen, wishing to discover a common original cause for all the exanthemata remarks that small-pox and measles usually become epidemic about the same time. Referring to his notes, he observes, that in the year 1752, scarce a family but was visited by other diseases at the same time, yet each individual had the two diseases in succession—Videas successive iisdem in aedibus occupare infantes quorum alii morbillis, variolis alii laborere demum incipiant.—*Rat. Med., vol. i., page* 102.

"Dr. Winterbottom, in a general vaccination, describes the retardation of that process, by the occurrence of measles, as an event too common to excite any particular attention. (*Med. Trans., vol. xiv., p.* 25). The same retardation was remarked by Dr. King, from the same cause. (*Med. Trans., vol. xiii., p.* 167). The same occurred to Mr. Wachsell, at a general inoculation in Walthamstow.

"Dr. Willan observes, that it is generally found the small-pox, measles, scarlet fever, and whooping-cough, become epidemic about the same time, and continue their progress, though not with equal violence. (*Diseases of London p.* 105). Yet of the three former he gives no instance in which two of them appeared at the same time in the same person. It is evident that this was not from any inadvertency, because we find the same accurate writer, on another occasion, observing that whooping-cough and small-pox had occasionally occurred in the same person and at the same time. On this I would remark, that after the febrile paroxysm of whooping cough has subsided, the disease loses its specific character, and if the lungs have materially suffered, the cough may be exasperated by the variolous paroxysm. But Dr. Willan, in another place (*Diseases of London, pp.* 38-39) asserts, that in some instances whooping cough commenced during the small-pox eruption. If this fact had been furnished by a less accurate observer, I would have objected, that whenever whooping cough is epidemic, we have usually other severe coughs at the same time, which in children, are not easily distinguishable from whooping cough. But admitting the accuracy of the statement, it only proves, as Dr. Willan observes, that the law, though very general, is not without any exception. We have also his own authority, that in some instances the whooping cough was instantly superceded by small-pox, and after the decline of the latter, returned with the same violence as before. Mr. Oakes (*Medical Journal*, vol. 8., p. 426) relates the case of a child whom he was under the necessity of inoculating with small-pox whilst under the whooping cough. The consequence was that as soon as the eruption appeared, the cough ceased and never returned. The same has frequently happened after vaccination, and I have reason to believe, permanently, as the cough has not returned at least ten days after the process of vaccination has been completed. This is now so generally understood, that many mothers have brought their children to the hospital for vaccination, under an expectation of curing them of whooping cough, and I do not recollect that any of them have been disappointed. However, I would never recommend it till the acute symptoms of the cough are passed, for, as till that time the full action of the disease is not over, it is reasonable to expect its return when the process of vaccination is completed.

"To those who are fond of tracing the operation of nature under disease, it will be curious to mark the exact regularity of the succession of these morbid poisons when they occur in the same subject. Mr. Hunter, (Introduction to Treatise on the Venereal Disease, and also to the Treatise on the Blood, etc)., found the variolous insertion in his patient interrupted on the fourth day after the puncture was made, till which time it had proceeded regularly. On the day following, the morbillous fever commenced, and on the fourth day after that, the measles appeared. Four days afterwards, the measles began to disappear. During these eight days, the variolous insertion had made no progress; but on the following day it recommenced its process, and in five days afterwards the variolous fever commenced. Here the constitutional *disposition* was interrupted on the fourth day. On its recommencement, five days more were necessary before the *action* could take place, nine days being the medium between the insertion of small-pox and the commencement of the variolous fever.

"Mr. Cruickshank's case (Treatise on the Absorbent Vessels, p. 126,) appears to have been interrupted *ab initio:* for he found his patient with all the symptoms of morbillous fever on the ninth day after inoculation. The punctures of the arms, therefore, continued invisible till the constitution began to recover from the measles, after which time the punctures inflamed and required their full period of eight days for the appearance of small pox.

"In a general vaccination at Walthamstow, two children were seized with the morbillous eruption on the eighth day after vaccination. In these the areola from that virus was suspended for four days. In a third, on the tenth day; and here the interruption to the process was only three days.

"But a most elegant experiment, in illustration of this subject, is contained in Dr. Willan's last number of Cutaneous Diseases. 'I inoculated,' says Dr. Willan, 'about the same time, three children with the fluid contained in these (lymphatic or miliary vesicles in measles), but no effect was produced by the inoculation. A similar trial, at the inoculation hospital, proved more successful. Richard Brooks, aged eighteen, was inoculated by Mr. Waschsel with fluid from the miliary vesicles in the measles, and with vaccine virus, January 6, 1800. On the tenth there was some redness and ulceration in both the inoculated places. January 15, the redness round the part where the lymph of the measles was inserted had disappeared, while the vaccine pock was vivid. January 18, the vaccine disease was over. January 22, he has a severe cough, sneezing and watery eyes, with cold shiverings and fainting. January 28, the measles appeared; his eyes were inflamed and the lids swollen. January 29, the efflorescence was diffused all over the surface of the body; frequent cough and violent fever. February 1, efflorescence disappeared; cough and fever much abated. From that time he gradually recovered, and was dismissed in health on the twelfth of February.'

"This interesting passage, besides containing an account of the successful inoculation of the measles, affords also a striking illustration of the protraction of a disease, after the disposition of it had taken place, and its regular return to complete all its periods, as soon as the cause which interrupted them ceased. This subject was, at the same time, susceptible of the two contagions; and as long as the diseased actions were local, both went on at the same time in different parts. But as soon as the constitutional disposition commenced in one (the vaccine), the local action from the other was suspended. When the vaccine disposition and action were completed, the rubeolous disposition commenced. Four days afterwards the constitutional symptoms showed themselves, with cough, sneezing and watery eyes.* In six days more the eruptive symptoms began, and were completed on the following day. On the fourth day afterwards, the efflorescence disappeared and the symptoms abated, making, in the whole, about twenty-seven days, a fair allowance for the two diseases.

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*Dr. Willan considers the common period, after infection by effluvia, before these symptoms appear to be from six to ten days. The anticipation in this case, by inoculation, is nearly analogous to the mean difference between inoculated and casual small-pox.

"The following laws, then, are to be admitted with as few exceptions as any others that are received in pathology:

"1. All persons are susceptible of the impression from a morbid poison, in proportion as they are unaccustomed to it.

"2. That *susceptibility* and *disposition* are necessary in a constitution or part before the action excited by a morbid poison can take place.

"3. That after the constitutional disposition has taken place from a local diseased action, the destruction of that local action will prevent the future appearance of the constitutional disease.

"4. That no two actions from two different morbid poisons can be carried on at the same time in the same part, or in the same constitution.

"5. If a constitutional disposition to one morbid poison exists, whilst the action of another is going on in the constitution, we ought to expect the action of the first to appear after the action of the second is completed, or has ceased.

"6. Though nothing can prevent an *action* from following after a *disposition* has taken place, yet a *disposition* may be *prevented* by preventing a susceptibility in the constitution or part.

"7. The susceptibility may be prevented by rendering the constitution familiar with the morbid poison, or, as long as the constitution is exposed to it, by keeping up a constitutional action previously excited by another morbid poison, or any other cause."—*Adams on Morbid Poisons, pp.* 21-23.

Dr. Lundford, a native of Jamaica, who made *Yaws* the subject of his inaugural dissertation, states that "those who are under the *Yaws* are liable to the other exanthemata, such as measles and small-pox. The latter may be induced by exposure or inoculation, which last is better attempted when yaws is in the decline, for then the small-pox will either entirely take away yaws, or at least will check it for some time; nor will the funguses continue long, even if they should happen to appear again on the surface."

Upon this observation Mr. Adams, in his work on Morbid Poisons, remarks:

"All this is perfectly analagous to what has been traced in other morbid poisons. It is probable that the irritation from small-pox and measles, being greater than from yaws, may interrupt the latter at any time. But the laws of that poison, requiring a certain course to be pursued, if the new irritation is induced before that course is completed, the disease must return as that new irritation ceases. If, on the contrary, the irritation has not been induced till the course of yaws is completed, and nothing remains of it but an habitual ulceration, the new irritation will not only supercede the old action, but by breaking the habit very much expedite the cure."

"Dr. Dancer, in confirmation of the above, gives the following quotation from Dr. Membhard: 'During the universal prevalence of small-pox in this Island, in the year 1784, it was remarked, that several negroes afflicted with yaws, who had the yawy pustules on the surface of the body, and *had been a considerable time* under all the afflicting circumstances of the disease, were inoculated promiscuously among many other negroes. The result was that upon the decline of small-pox, and dying away of the pustules, the yaws also gradually disappeared; as if both might be considered in the light of one congenial disease. (*Adams on Morbid Poisons*, pp. 212-213.)

Dr. Delgrade relates several cases of the simultaneous occurrence of small-pox and measles, which ran their course together. A child was inoculated with the matter; on the eighth day, this infant, after a slight indisposition, took the measles.

"On the fifteenth, after having completely recovered from the measles she became very feverish. Between this and the twentieth, she had several convulsions. On that day small-pox appeared. The infant not having been near any other child with that disorder, it was thus proved not only that the eruption was variolous, but that the fever was infectious.

"Still the difficulty remained of accounting for its origin, since no small-pox was known to prevail in the neighborhood. The parents and neighbors could give no clue. Soon afterwards I heard that a child had recently died of combined small-pox and measles Unable to trace this report, I concluded it was merely an erroneous account of the present case. Calling, however, with Mr. Daniell, on a female, one of his dispensary patients, she informed me that the child was her own. Of this case I can give no accurate narrative. The mother herself was dying, and the child had been visited by no medical attendant. Judging from the statement, I imagine the two disorders occurred in succession, not simultaneously. The child was taken ill some days before Brookes' and certainly died of small-pox. Yet even this was unsatisfactory since the families lived at a distance from each other. No communication of the children was known, until I discovered they had attended the same school, a circumstance of which their friends were mutually unconscious." (*Medical Chirurgical Transcript, of London*, vol. 1, Part I.)

Dr. Russell, in noticing the reciprocal influence of small-pox and measles, states that he carefully watched above three hundred cases in which these diseases succeeded each other, at a time when they were both epidemic at Aleppo (1765). He noticed that the measles rarely succeeded small-pox in less than twenty days from the first appearance of the eruption. Several cases occurred where small-pox succeeded measles before the total disappearance of rubeolous rash from the extremities, that is on the eleventh or twelfth day of the eruption. He adds, "so little did the quality of the first disease influence that of the second, that a mild, distinct small-pox was often observed to follow the worst kind of measles, and vice versa." Willan relates the case of a young man, aged eighteen, inoculated for measles and cow-pox on the same day; the cow-pox took the lead, measles following at the end of sixteen days; and Dr. Gregory has described a case very analogous, but there measles had the start, and after sixteen days cow-pox had its turn. Dr. Gregory calls attention to the fact, that in each case sixteen days was the period of suspension, and expresses his belief that this was not accidental. (Lectures on the Eruptive Fevers.)

Dr. Moreland reported to the Boston Society for Medical Improvement the following interesting case:

On the thirteenth of February, 1856, he vaccinated a healthy male infant, six months old. On the seventeenth of the same month, a faint but sufficiently distinct eruption of measles was observed about the neck and shoulders. The usual symptoms of rubeola had declared themselves on the next morning after the vaccination, and the disease, consequently, must have commenced only a few hours previously to that operation, if four days be adopted as the period elapsing between the attack and the appearance of the eruption. The vaccine vesicle matured very slowly for several days, and the rubeolous eruption continued with varying distinctness, but always comparatively slight, until the nineteenth of February, when it disappeared. The vaccine vesicle then took a start, and went on rapidly to perfection. There seemed to be a retarding action reciprocally maintained for a time by the two affections, thus accidentally concurrent; vaccine finally prevailing. The circumstantial record made at the time reads thus:

"February 17, vaccination apparently taking effect, measles appeared; will the vesicles be retarded? 18, vesicles advancing very slowly, measels retrograding; ordered a warm bath. 19, vesicles going on, but more slowly than is common; less redness around it; eruption of measles gone; will it recur? 20th, vaccine vesicle much larger; child feverish; warm bath. 21, at 7:15 o'clock in the morning, the child was seized with a severe general convulsion. He was seen by Dr. M. in about twenty minutes; a warm bath had been used. Wine of ipecac, and enemata, with cold lotions to the head, were at once resorted to, and subsequently, three grains of calomel with five of rhubarb were given. Aspect of the little patient pale and confused. At 1:45 o'clock p. m., he had another convulsive attack of rather greater severity. By previous direction, he was immediately placed in a warm bath, the body and limbs were well rubbed with the hands, and sinapisms were applied to the abdomen and to the feet; the face being colored and the scalp showing many turgid vessels, a large leech was applied to the left temple, and the wound was allowed to bleed for half an hour after the animal fell off. No more convulsions through the day. At 7:30 o'clock p. m., mustard was applied to the back of the neck. The night of the twenty-first was passed by the patient in quiet sleep. 25, very bright and well to all appearance, until about 9:30 o'clock, a. m., when he had another very severe convulsion, lasting several minutes longer than the two previous ones. He was seen fifteen minutes after the access of the fit; was found stupid, with an occasional wild look in the eyes; had been placed again in the warm bath. Mustard-water frictions to the extremities were continued; the head being rather hot, cold applications were cautiously made to it; one drachm of castor oil was given; discontinued the breast milk.

Dr. Storer saw the patient at this time, and recommended Dovers powder, one eight of a grain of the former to one half of a grain of the latter, every three hours A continuance of the mustard-water frictions were also advised. Dr. S. believed that another leech might be needed. Dr. James Jackson, who had been sent for at Dr. M.'s request, visited the child shortly after, and gave a favorable prognosis. It was thought best by him to restrict the child's nursing to one minute's time every two hours; and, in the intervals, to allow sugar and water. Dr. J. thought that although another leech might possibly, be required, he should be 'slow to apply it.' The remainder of the management was concurred in. The powders above mentioned were commenced, and the other means continued. There seemed a degree of amendment in the afternoon of this day, and there had been some good sleep. The night of the twenty-second was quietly passed; there was only one dejection; a little colicky pain from flatulence; no convulsive action. 23, Quite well, seemingly; pulse 118, rather sharp (yesterday, 128 to 130); skin moist; one powder was taken at bedtime last evening, and another this morning. The vesicle of vaccination has broken and dried into quite a large scab; it was full, yesterday. In the afternoon of this day the child seemed dull and stupid, possibly from fatigue; the lips and tongue somewhat swollen; suspended the regular use of the powders; renewed the mustard frictions, etc. He was now allowed to draw the breast during three minutes, not having nursed for three hours previously. Flatulence troublesome; relieved by mint-water. 24, night quiet; had one dejection; got one powder about midnight; the eyes somewhat red; no signs of returning rubeolous eruption; tongue white; occasional colic. 25, nearly as well as ever. 26, same record. 27, a cervical gland, on the left side (that of vaccination), much enlarged; otherwise very well and lively. Discontinued visits. From the last date to the present time, there has been no untoward occurrence, the child seeming better even than before its illness.

"The supervention of measles upon vaccination, by the doctrine of chances, must be rare; a purely accidental occurrence. The points of interest in this case are the evident mutually retarding influence of the two affections thus coexisting; the modification of the vaccine vesicle and of the eruption of rubeola by this action—not uncommonly witnessed under such, or similar, circumstances of complication—and, especially, the convulsions, as to their *cause*. Dr. M. was at first inclined to ascribe these to the retrocession of the measles; but it will be noted that they were manifested upon the eighth day after vaccination, when the vesicle should be perfect and the primary febrile action is usually observed—and consequently they may be more reasonably referred to the latter. This was Dr. Jackson's opinion. How much influence the conjunction of the two affections may have had, however, can hardly be determined. In his recently-published volume, Dr. Jackson gives an instance where convulsions took place in a child on the eighth day after vaccination. Some time previous to this the patient had had pneumonia, which was ushered in by convulsions, and the same had occurred, also, during dentition. Dr J. had apprehended they might take place after the vaccination, and had forewarned the mother on the subject. He refers to other cases in which convulsions were observed in children at the commencement of bronchitis and scarlatina, but mentions only one after vaccination. In the case detailed above, there had not been any convulsions, previously, nor any threatening of them; there was, therefore, no reason to expect them.

"In this connection, the remark of Sydenham may appropriately be referred to 'that an epileptic fit, in infants, is so sure a sign of small-pox, that if, after teething, they have one, you may predict variola—so much so that a fit over night will be followed by the eruption next morning. This, however, will be generally mild, and in no wise confluent.' (Works, Syd., Soc. edit., v. 2, p. 252.) Dr. Jackson also remarked 'that he believed convulsions are not rare in children, when the symptoms, so-called, of small-pox, first appear—corresponding to the eighth day of vaccination.' It would seem that the accident must be frequent after simple vaccination."—*Boston Medical and Surgical Journal, June* 19, 1856.

Joler has described an epidemic of measles that took place in the Retzat Circle, in Bavaria, in the district where he himself resided. He says that the disease was much milder among the vaccinated than among the unvaccinated. Fifteen in fifty-two died among the non-vaccinated, while barely one in three hundred died among the vaccinated, showing that measles was eighty-six times more fatal among the former than the latter.

As far as our knowledge extends, there are but few facts bearing upon the question of the possibility of the transmission of the poison of measles along with the vaccine virus.

The experiments of several authors have shown that measles may be transmitted by inoculating a sound person, either with the blood, with the fluid of the accidental vesicles which sometimes complicate the eruption, or with the secretions of those affected with the disease.

Dr. Home, of Edinburgh, in 1758, appears to have been the first European physician who proposed and performed the inoculation of measles. His method of inoculation was to apply cotton dipped in the blood of a measly patient to a wound in the arm of the well patient. He describes the febrile symptoms as appearing on the sixth day, and of a mild character, with no secondary complications.' (Clinical Facts and Experiments, 1858.)

Mr. Wachsel, of the Small-pox Hospital, in the early part of this century, inoculated successfully a lad with fluid taken from the measly vesicles. In 1822, Dr. Speranza, an Italian physician, in the territory of Mantua, repeated the experiments of Dr. Home, Professor of Meteria Medica in the University of Edinburgh. He inoculated six cases and afterwards himself, with the blood taken from a slight scratch in a vivid papula. In a few days the measles appeared, and went through their course mildly and regularly. This encouraged him to make further experiments, and he says they were all successful.

Dr. Von Katona, ot Borsoder, in Hungary, conducted an extensive series of experiments upon the inoculation of measles in 1842. He inoculated 1,122 persons, by taking the blood and fluid from the vesicles, or a drop of the tears from a patient laboring with the disease. The operation is said to have been performed in the same manner as the inoculation for small-pox; the infecting blood was drawn from the vesicles most effloresced. The puncture was immediately surrounded by a red areola, which soon disappeared. On the seventh day the fever set in with the usual premonitory symptoms of measles, as rigors and catarrhal symptoms; on the ninth and tenth day the eruption appeared; on the fourteenth desquamation commenced with decrease of fever and eruption; and on the seventeenth day from inoculation (seventh and sometimes eighth from eruption) the patients were in general convalescent and apparently well. Dr. Katona failed only in seventy-eight cases out of 1.112 (seven per cent.); and he affirmed that the resulting disorder was mild, contrasting favorably with the severity of the reigning epidemic. No deaths occurred among the inoculated. The fruitless and unsatisfactory experiments which have been performed at different periods for the purpose of testing the possibility of inoculating measles, cannot be adduced as evidence against these well-established facts, for a single successful inoculation is sufficient to overthrow any number of unsuccessful attempts.

Dr. George Gregory, in his valuable *Lectures on the Eruptive Fevers*, even goes so far as to express his belief that the child whose case he had detailed as having undergone cow-pox after measles, "received the germ of measles and of cow-pox at the same time; in other words, that unknown to me the child that furnished the lymph was incubating the measles, with the zuma or poison of which the vaccine matter had been impregnated."

The following is the case as recorded by Dr. Gregory:

Eliza Finch, aged four months, residing at Pentonville, was vaccinated by me at the Small-Pox Hospital, May 15, 1835. May 17 the child began to droop. Bilious vomiting, very severe, with drowsiness, succeeded. Much blood passed by stool. The head was very hot. Vomiting continued all that and the four following days. It ceased on the twenty-second. On the twenty-fourth the other febrile symptoms yielded a little. On the twenty-fifth (nine days from the invasion of symptoms, and eleven from the probable reception of the germ,) measles appeared and went through its course regularly.

Whilst the preceding facts, in the main, support the doctrine of Hunter, and show that where two poisons, representing two distinct contagious exanthematic diseases, act simultaneously upon the human being, the most obvious pathological phenomena excited by the poisons will not occur simultaneously, but in succession, the one poison retarding the action of the other, the one producing its cycle of changes, whilst the other remains dormant, as it were, during the action of the other, and immediately after the changes induced by the first cease, inducing its own distinct effects; at the same time it must be admitted that the character and course of these specific eruptive diseases are greatly modified by such altered states of the constitution as exist in scurvy, scrofula and secondary syphilis.

In that class of diseases represented by constitutional syphilis and scurvy, the whole mass of blood is at fault, and the nutrition is perverted, and the course and products of diseased actions are comparatively modified.

As all the nutritive processes are more or less deranged in scurvy and secondary syphilis, and as it is now established that the blood in the latter disease is capable of reproducing syphilis when inoculated in healthy bodies, and as we have shown that in scurvy the blood is so deteriorated and the forces so depressed, that the smallest injuries tend to degenerate into foul gangrenous ulcers, it is but reasonable to conclude, apart from well-established facts, that the vaccine lymph would partake of the qualities and properties of the blood from which it is formed, and the parts by which it is secreted. And even if the doctrine be maintained that the vaccine matter, as well as all other special morbid poisons, have an unvarying chemical and physical constitution, the difficulty is not removed, as in the practice of vaccination we are unable to separate the active agent of the virus, from much extraneous matter, as lymph and blood. And we contend that it is impossible to open a living vaccine vesicle and draw matter for vaccination, without injuring to a greater or less extent, the delicate blood-vessels, within and around the vesicle.

With reference to the concurrent action of the poisons of two contagious exanthemata, upon the same system, we know nothing whatever of the state and mode of the existence of that poison which lies dormant whilst the other is acting. Does it remain in the part where it has been inserted, or does it exist as well in the blood, and effect those organs and tissues which are not implicated in the action of the first?

Until the relations and effect of each exanthematous poison has been carefully studied, and its effects determined upon the constitution of the blood, upon the process of nutrition, upon the action of the nervous system, and upon the chemical and physical phenomena of the body, as manifested more especially in the disturbances of circulation, respiration and calorification, and excretion, it will be difficult if not impossible to settle such questions.

RELATIONS OF CHICKEN-POX TO SMALL-POX—HISTORY AND PHENOMENA OF CHICKEN-POX (VARICELLA) — DIFFERENTIAL DIAGNOSIS BETWEEN VARICELLA AND VARIOLOID.

CHICKEN-POX (VARICELLA) CRYSTALLED — VARIOLA SPURIA — VARIOLA LYMPHATICA—VARICELLA VOLATICA—VARIOLA PUSILLA—EXANTHEMA VARICELLA.

Definition.—An eruption over the body, of semi-transparent glabrous vesicles, with red margins accompanying a slight attack of fever, seldom passing into suppuration; but on the third day, bursting at their tips, concreting into small puckered scabs, and leaving no cicatrices. The disease consists of a specific eruption, in a series of new crops usually appearing for several days in succession; so that dried and fresh vesicles are often alongside of each other, on the breast, back, face, and extremities, preceded by fever. The disease may be portracted for a fortnight or longer.

Changes of Temperature.—According to Thomas and other observers,* sometimes in the incubation stage of *varicella*, there are slight elevations of temperature, and at the time of the eruption in many cases the rise of temperature is very trifling. In the majority of cases, however, sometimes at the beginning of the exanthematic period and sometimes after a copious eruption had been developed, there is a sudden and relatively considerable elevation of temperature, sometimes indeed only a few tenths over 38° c., or about 101° F.; in rather severe cases 38.5° c. (101.5° F.) to 40° c. (104° F.); but seldom more. The high stage lasts from two to five days, and the fever is remittent, and as regards the height of the temperature corresponds pretty accurately with the copiousness of the eruption. The maximum temperature occurs sometimes in the first, but more often in the second half of the fastigium, and the morning remissions after the maximum were somewhat more considerable than they had been before. Defervescence was rapid and commonly over in half a day.

Under the name of chicken-pox, or *varicella*, have generally been comprised certain eruptions which closely agree in many features with each other, and which in some respects resemble small-pox. It is from this latter circumstance that they deserve a particular notice, as they are generally of so slight a nature as to require but little medical treatment. They were formerly very generally confounded with small-pox; but the difference between them was remarked as early as the beginning of the sixteenth century, by Vidus Vidius and Ingrassis. Sennery and Riveri, professors at Wurtemburg and Montpellier, at the commencement of the seventeenth century, and Diemerbrock, state that the distinction was well known in Germany, France and Italy, to the vulgar, who had a separate appellation for this eruption. Morton was the first in England to mark the difference, and to describe this disease under the name of "*chicken-pox.*" Since then it has been noticed by Fuller, and accurately described by Heberden. Heberden, however, continued to designate it by the term *variola pusilla*; whilst his cotemporaries, Vogel, Burserius and Sauvages, also applied to it the generic term, *variola*, with the specific designation of *volaticæ*, *spuria* and *lymphatica*.

Dr. Heberden must be regarded as the principal writer on varicella, who, in 1767, published in the first volume, page 427, of the Transactions of the Royal College of Physicians, a description of the disease, professing to give a full and accurate account, not only of its symptoms, but of its pathological relations; and for a long series of years this paper was looked upon as a standard authority on this disease.

In 1805, Dr. Frank, of Vienna, carefully distinguished the several kinds of spurious small-pox, and by way of distinction applied to them the names of *pemphigus varioloides*, *vesicularis* and *solidescens*. His description of the former disease corresponds accurately with the complaint hitherto called chrystal-pock, water-pock and chicken-pock.

In 1809 a detailed account of varicella was published by Dr. Heim, of Berlin, but much confusion is occasioned by his applying the same term to designate three kinds of spurious small-pox—the water-pock, the horn-pock and the swine-pock. Dr. Heim affirmed that matter taken from a subject who has chicken-pox will only produce chicken-pox, and afford no protection from small-pox. He also states that the cicatrices left by varicella were different from those of variola, and that a careful inspection of them is alone sufficient to designate the one disorder from the other.

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* Archiv der Keilkunde, 8, 376; Archiv fur Dermatologie and Syphilis, 1, 309. Temperature in Diseases, *Dr. C. A. Wunderlich*, New Sydenham Society, 1871, p. 311.

We find, upon careful examination, a similar statement as to the inoculability of chicken pox, in "*The Report on the Cow-pox Inoculation, from the practice at the Vaccine-Pock Institution, during the years* 1800, 1801 *and* 1802, *read at the general meeting of the Governors, February* 7, 1803, *at the Shakespeare Tavern; written by the Physician of the Institution; to which are affixed two painted engravings of cow-pox and other eruptions.*" London, 1803; p. 41.

The following is the detailed statements of the Physicians of the Cow-pox Institution, Drs. George Pearson, Lawrence Niholl and Thomas Nelson in the above mentioned report:

CHICKEN-POX OCCURRING DURING VACCINA, AT ANY PERIOD, AS WELL AS AFTER THE VACCINA.

2. CHICKEN-POX—Intervening cases have occurred of chicken-pox not only at all times during the cow-pock, but immediately after the scabbing process; as well as subsequently at a much later period. In this last respect of the chicken-pox after the formation of the scab, or at a later period of the cow-pock, there is a difference between the chicken-pox and small-pox. No differences was observed in the stages of the cow-pock, or of the chicken-pox, when the two diseases went on together; except that the cow-pock was sometimes a little retarded in scabbing.

In these instances there may be a constitutional affection for each of the diseases on different days, or they may occur together.

In one case, the chicken-pox and the vaccine pock were inoculated on the same subject, and both went on as usually distinctly."

Dr. Willan, in 1806, advanced somewhat our knowledge of varicella, by some observations published in the seventh and eighth edition of his work, (On Vaccine Inoculation, qt., p. 86). He therein describes with great minuteness, the appearance of varicellous eruption, which he subdivides into three varieties.

In 1820, Dr. Thomson, of Edinburgh, published his views on the identity of the chicken-pox of Morton and Haberden with small-pox, in his account of the varioloid epidemic of Scotland during the years 1818 and 1819.

This opinion of Dr. Thomson, which we have already presented in detail in a former portion of this inquiry, was nothing more than the revival of an old doctrine.

The learned Dr. John Thomson and Mr. Berard urged, in favor of this opinion, the circumstance of variola and varicella appearing from the same exciting cause, whether those affected have been vaccinated or not; and affirmed that persons exposed to the infection of chicken-pox have caught small-pox, and that the former appears only in those whose constitutions have been modified by the influence of either small-pox or cow-pox. On this subject M. M. Schedel and Cazenave remark, that in those epidemics which they have had opportunities of noticing in Paris, the several eruptions might be classed under three heads: 1, variola properly so-called; 2, the malady termed varioloid or variola modified; 3, an eruption purely vesicular, offering every appearance of varicella.

The same cause, namely, variolous infection, seemed to develop these several eruptions, which were observed in the same quarters, in the same streets, in the same houses. When the disease made its appearance among a numerous family, some had small-pox, some modified small-pox, and others chicken-pox. One circumstance was striking to every one, namely, the mildness of the disease in those persons who had been vaccinated, and in the majority of those who had already had variola.

Whilst these facts appear to favor the old view, revived by Dr. Thomson, many cogent arguments have been urged against it by Abercrombie, Bryce, Luders, Fisher and others.

1. It is very difficult to determine, during a small-pox epidemic, whether the occurrence of that disease among individuals coming in contact with persons infected with the chicken-pox is rather the result of this communication than of the variolous infection, which, at that moment, develops on all sides.
2. Vesicular varicella, so-called, is not transmitted by inoculation, and never produces variola.
3. Those persons who consider chicken-pox as contagious have confounded it with modified small-pox.
4. Varicella appears in persons who have not been vaccinated, and who have never had the variola; consequently, in such cases, it cannot be regarded as a variola modified by the prior existence, either of the disease or of vaccination.
5. Vaccination practiced shortly after the disappearance of varicella, pursues its course in the most regular manner, which never happens when vaccination follows variola.
6. The progress of varicella is uniformly the same whether it occurs before or after vaccination, or after variola.
7. Variola sometimes reigns epidemically, without being accompanied by varicella; and on the other hand, the latter may become epidemic without being attended by the former.

In fact, the characters of the eruption, and the symptoms of varicella, differ essentially from those of variola.

Dr. John D. Fisher, of Boston, in his valuable work on small-pox, varioloid disease, cow-pox and chicken-pox, the first edition of which was published in 1829, gives an elaborate description of chicken-pox.

Dr. Fisher strongly advocated the doctrine that "the small-pox and the varioloid are one and the same disease, the latter being only a modification of the former, and that the chicken-pox is a separate and independent malady. * * All the observations that I have been able to make go to confirm the truth of this opinion. Indeed, the fact that the small-pox and the varioloid are capable of engendering each other, and that the chicken-pox has, year after year, prevailed epidemically in many of our towns in which the small-pox never appeared, and consequently without giving rise to it, settle the question concerning their identity."

Dr. John Hughes Bennett(1) held with Dr. Thomson, the opinion that chicken-pox was a modified form of small-pox; and this view has been more recently revived by Dr. Hamernjk, of Prague, and Professor Hebra. On the other hand many systematic writers of this day, as George Gregory,(2) James Copeland,(3) Felix Von Niemeyer,(4) J. F. Marson,(5) Edward Ballard (6) and William Aitken(7) regard the disease as wholly distinct from small-pox and varioloid.

(1.) Clinical Lectures on the Principles and Practice of Medicine, third ed., p. 976.
(2.) Cyclopaedia of Practical Medecine; Philadelphia, 1859, vol. 4, pp. 636–689.
(3.) A Dictionary of Practical Medicine; New York, 1855, vol. 1, pp. 369–371.
(4.) A Text Book of Practical Medicine; New York, 1869, vol. 2, pp. 560–562.
(5.) A System of Medicine, Renolds; Philadelphia, 1879, vol. 1, pp. 124–127.
(6.) Vaccination, its Value and Alleged Dangers; a prize essay; London, 1868, p. 6.
(7.) The Science and Practice of Medicine; Philadelphia, 1872, pp. 421–424.

DESCRIPTION OF VARICELLA.

Under the name *chicken-pox* are included different varieties of eruption, generally characterized by very slight and brief antecedent fever, consisting of vesicles or very imperfect pustules, which maturate and decline in three, four and five days, occurring chiefly during infancy and childhood, but also at adult age, and occasionally prevailing epidemically. The generic term, *chicken-pox*, comprises three *species*, or, rather, varieties, which have been distinguished from each other for very many years in America, and in different parts of England, by the names of chicken-pox, swine-pox and hives.

These Willan and Bateman distinguished, according to the form of their vesicles, into: First, *Varicella Lentiformis;* second, *Varicella Coniformis;* and, third, *Varicella Globularis.* Dr. Good adopted these names and distinctions, but added a *fourth*—the Varicella Corymbosa—the clustering or confluent chicken-pox, which, if considered at all as a distinct variety, is not of frequent occurrence, but has occasionally been observed by Bateman, King and Copeland.

Anatomical Appearances.—The exanthema begins as small, red, distinct spots, which, after a few hours, are changed to liquid vesicles of the size of a pea or lentil, by a copious serous effusion between the cutis and epidermis. These vesicles have neither a central depression nor a cellular formation. After a time these contents become whey-like, but never purulent, Thin crusts form from the dried vesicles, which fall off after a few days. without leaving a cicatrix. From the form of the vesicles, the different vareities, varicellae globulosa, ovalies, lenticulares, coniformes, and acuminatae, are distinguished. We often see, especially when the eruption is very extensive, that, besides numerous varicella vesicles running the usual course, a few filled with pus (varicellae pustulosae) acquire the appearance of variola pustules, and even leave cicatrices. Since the form of variola pustules is not specific, but exactly resembles that of some erythma pustules, we should not attach too much importance to the external resemblance of some of the efflorescences in varicella to those in variola, and consequently consider the two diseases as identical.

Symptoms.—There are no symptoms to be noticed before the eruption, they are absent or slight; headache and feverishness precede the eruption by a few hours; cough is sometimes observed.

Eruption Period.—The eruption appears within the first twenty-four hours of indisposition, in the form of small sore spots, slightly accuminated; from ten to fifteen come out on the first day; they appear on any part of the body. The vesicle is preceded by a red spot or papule, due to hyperaemia of the cutis vera, and not to an exudation into it, for tension of the skin causes the varicellous papule to disappear.

On the second day there may be a hundred or a hundred and fifty fresh spots; those of the previous day have the epidermis raised in the form of a bleb, sometimes perfectly round, containing serosity as clear as water; there is no inflammatory areola. The vesicles from the first have the size of split peas, and that size is soon attained or exceeded. The patient has the appearance of having been subjected to a shower of boiling water.

The vesicle is unicellular, not umbilicated, has a very delicate cuticle, and when picked collapses perfectly.

The eruption occupies all parts of the body, the hairy scalp not excepted. The shape of the vesicles on the trunk is often oval, the long axis being athwart that of the body. Itchiness is common and impels the children to rupture the vesicles.

The next morning a hundred or a hundred and fifty new spots will have appeared during the night, the eruption of the preceding day having become vesicular. The contents of vesicles which have lasted twenty-four hours become slightly milky; the turbidity however is uniform. A slight inflammatory areola appears. This nocturnal outburst of spots, which become vesicular within ten hours, is repeated for four of five succeeding nights from the beginning of the disease.

Many vesicles, as soon as they have attained their full size, get broken and so encrust at once. Those that remain unbroken present on the third, fourth or fifth day of their existence a small central scab, which quickly attains to the size of the vesicle in a day or two.

The scab is thin and granular; it falls in fragments, and leaves no enduring redness and no cicatrix. If the vesicles have been subjected to unwonted irritation, the scab may be thick, coherent, and may leave when it falls a permanent pit.

The following table presents a comparative view of the phenomena of small-pox and chicken-pox:

Table, Giving a Comparative View of the Phenomena of Small-Pox and Chicken-Pox.

SMALL-POX.	CHICKEN-POX.
1. The fever is ushered in by a cold stage, is severe and continues three or four days, and after declining or ceasing in the eruptive process, it commonly reappears during the suppurative stage, or between the fifth or eighth day of the eruption.	1. The fever is not often preceded by a cold stage, is uniformly light and is frequently insensible; it seldom continues more than two days, and never reappears after it has once ceased. When, however, the vesicles appear in successive crops, the fever lasts longer and continues until the eruption is completed.
2. The eruption is often preceded or accompanied by an erysipelatous efflorescence.	2. This efflerescence does not take place.
3. The eruption does not break out until the third or fourth day of the fever; it appears first on the face, then on the neck, chest, trunk and extremities, and is completed in the course of two days.	3. The eruption breaks out by the termination of the first or on the second, and almost invariably before the end of the third day of the fever; it usually appears about the breast and shoulders first, afterwards on the face and extremities. It frequently appears in successive crops for four or five days.
4. The eruption presents itself in the form of small red circular points or papulæ; these are hard, resisting and moveable, and communicate to the finger a shot-like sensation. They scarcely project above the surface, but are easily and distinctly felt by drawing the finger over them.	4. The eruption likewise breaks out in small inflamed spots, but these are not papular in their origin and are not exactly circular, but tend to an oblong figure. They may be distinctly felt by the finger, but they are yielding under it, and are destitute of the tubercular hardness and rolling motion which characterize the variolous eruption at the same period.
5. The eruption seldom becomes vesicular before the end of the second or the commencement of the third day, and the vesicles are confined to the summits of the pocks.	5. The eruption is vesicular from the beginning or from the early part of the first day, and by the second day the whole surface of the pocks are converted into vesicles which resemble little bladders of transparent fluid.
6. The pustules at first have accuminated summits; they aftewards become rounded, and at an early period present slight depressions in the centre of their surfaces.	6. The vesicles are usually lenticular in form, but are sometimes conoidal or globate, and present one shape through their course, or until they become ruptured.
7. Eruption is situated in the substance of the cutis.	7. Not formed in the true skin, but upon its surface, not in the cellular tissue between the skin and cutis.
8. The pustules after they have become vesicular are distinguished by hard, unyielding bases.	8. The vesicles are destitute of tuberculous bases, are yielding, and easily give way under pressure, and communicate to the finger a soft, elastic sensation, or a feeling similar to that which a minute globule of fine sponge softened with water would give rise to when pressed.
9. The pustules are composed of little cells, all of which communicate with each other; and the cuticular coverings of the pocks are opaque, tough and not easily broken.	9. The vesicles are composed of a single cavity, and the coverings are extremely thin and fragile, are diapthanous and very easily broken.
10. The pustules are at an early stage filled with a serous secretion; this after a time becomes converted into purulent matter that exhales a very unpleasant and peculiar odor.	10. The vesicles contain, when fully matured, only a whitish transparent, serous fluid; this never, except through accident, becomes pus, and is destitute of any unpleasant odor.
11. The pustules remain whole until they are six or seven days old, when some of them commonly become ruptured, and permit a little of the virus to ooze out upon their surface; but they still retain their form and prominence.	11. The vesicles often become broken in two or three days after their appearance, and permit the whole of their contents to escape; their coverings then sink down and collapse, and the vesicles become flattened, or lose their original form.

SMALL-POX.	CHICKEN-POX.
12. The pustules break out simultaneously, pursue a regular march and arrive at maturity about the same time. Desiccation does not commence until about the eighth day of the eruption. The process of eruption of suppuration and of desiccation constitute three successive periods, rendered distinct from each other by their duration; the first occupies about three days, and the other two about five days each.	12. The vesicles generally break out in successive crops for a number of days, in which case a great variety may be observed among them; some are appearing, whilst others are fully formed, shriveled or crusted. Desiccation commences on the fifth day, or as soon as the vesicles are ruptured, and sometimes on the second, third or fourth days. The three periods of eruption, suppuration and desiccation seem to be confounded in consequence of the pocks in successive crops, the time of their duration seldom exceeding eight days.
13. A general swelling of the cutaneous surface takes place just before the pustules begin to desiccate.	13. Desiccation is never perceived by any extensive swelling of the cutaneous surface.
14. The scabs fall off in a single piece. The surfaces of those who have had the disease remains spotted for a long time. The scars which remain permanently in the skin are irregular in figure and present uneven surfaces.	14. The scabs do not usually fall off in a single piece, but in small fragments of different forms and sizes. The marks remaining in the skin after desquamation are but slightly colored, and the redness if apparent soon disappears When scars are left in the skin by the vesicles they are regular and figure in present smooth surfaces.
15. The small-pox, even when distinct and of moderate mildness, is a disease of fifteen or twentv days in duration, and often proves fatal.	15. Chicken-pox runs its course and is completed in five or six days, or in eight or ten at the most, and it never of itself proves fatal.
16. Communicated by contagion and inoculation, In varioloid or modified small-pox, the eruptions, for a considerable time after the scabs have fallen, leave little kernels or tuberculous elevations in the skin.	16. Not communicable by inoculation, as shown by Dr. Bryce. The chicken-pox never gives rise to true small-pox or varioloid, neither is it ever communicable by variola or varioloid.
17. The poison of small-pox, varioloid and cow-pox, in a majority of cases, preserve the system from second attacks of the same disease.	17. The chicken-pox when it prevails epidemically, attacks individuals who have never had the variolous and the cow-pox diseases, with equal readiness as it does those who have had neither.
18. Children have been attacked by *varicella* who have been vaccinated, or had variola only a few weeks before.	18. Varicella frequently occurs in children that have never been vaccinated, and its occurrence does not prevent them taking small-pox, nor prevent successful vaccination. Varicella must, therefore, be regarded as a specific disease.

SECTION IV.—DRIED VACCINE LYMPH, OR SCABS, IN WHICH DECOMPOSITION HAS BEEN EXCITED BY CARRYING THE MATTER ABOUT THE PERSON FOR A LENGTH OF TIME, AND THUS SUBJECTING IT TO A WARM MOIST ATMOSPHERE.

The effects of such decomposing matter, resemble those of the putrid matter received in dissecting wounds.

The practice of some physicians to mix a considerable portion of powdered vaccine scab, with water on a glass slide, and to use this in a number of vaccinations, from house to house, is not unattended with danger, especially during warm weather. The danger of this filthy procedure, is threefold. First, when the dried scab is used, the chances of communicating the vaccine disease by inoculation are lessened, and there is greater danger of communicating other diseases through the medium of this dried mass of pus, blood, lymph and cellular tissue. Second, when animal matter is finely divided and mixed with water, and subjected to a temperature of near summer heat, all the conditions are supplied for those active chemical changes, which in nitrogenized matters, frequently lead to the formation of poisons, capable of exciting rapid and destructive changes in the living organism. Third, in using matter from a common store, fresh blood is frequently conveyed from the patient vaccinated, upon the instrument or lancet, to the vaccine mixture. The liability to putrefactive change is not only increased by this mixture, but also the danger of communicating secondary syphilis, or any other disease capable of being transmitted by vaccination is augmented. When a score, or more, cases are vaccinated from the same supply, and with the same instrument, if the greatest precaution is not employed, more or less blood from different individuals becomes mixed with the virus. The method so common in America, of vaccinating with the dried scab, should be performed with great care.

In the warm climate of the Southern States, it is especially difficult to preserve vaccine matter for any length of time, without more or less change and even putrefaction. The length of time which the vaccine virus will retain its active properties, will depend upon the temperature and moisture of the climate.

The true mode of preserving and propagating the vaccine virus, is that recommended by Jenner, viz.; the inoculation of the lymph directly from the arm at a period not later than the eighth day. By a succession of such vaccinations upon a number of children, transported for this purpose, Dr. Francis Xavier Balmis, Surgeon-Extraordinary to the King of Spain, imparted vaccination to many nations during his voyage round the world (1803–1806) executed for the sole purpose of carrying to all the possesions of the King of Spain beyond the seas, and to those of other nations, the inestimable gift of vaccine inoculation.

At an early day in the history of vaccination, Dr. Jenner made numerous attempts to send the vaccine virus to the most distant possessions of the English in the East. After the failure of the virus sent by ships to India twenty recruits, or men of any description who had not had the small-pox, should be selected; and a surgeon appointed to attend the successive vaccinations. Dr. Jenner thus engaged that the vaccine disease should be carried in its most perfect state to any English Settlements. Upon the rejection of this proposition by the government, he formed the plan of equipping and sending out a vessel to India with such arrangements and such a number of men as to ensure the continuous transmission of the vaccine virus, by private subscriptions, and put down his own name, for one thousand guineas. Before his design could be carried into execution, tidings arrived from the east, that Dr. De Carro had succeeded in forwarding vaccine matter from Vienna to Constantinople, and from thence to Bombay. The manner in which Dr. De Carro, (by whose unwearied labors the vaccine disease was first disseminated over Germany, Venice, Lombardy and other parts of Europe), transmitted the vaccine virus to India, possesses great interest at the present time, when so much carelessness is manifested by the profession both in the selection and in the preservation of the virus.

Many disappointments having arisen from the difficulty of transmitting it in an active state to distant countries, Dr. De Carro employed every expedient that ingenuity or experience could suggest to obviate them. Various methods had been tried. Impregnated lint, or threads enclosed between plates, or in bottles and in tubes closed up with wax. The practice of imbuing the points of common steel lancets was soon abandoned. To these succeeded lancets of silver, silver gilt, gold and ivory. After a series of trials Dr. De Carro gave the preference to ivory, which he considered to be, in all respects, the most secure vehicle for transporting the virus. On lancets of this material it was sent from Breslau to Moscow, where, under the patronage and actual inspection of the Russian Empress, it completely succeeded. As that which was destined for Bagdad would be exposed to the accidents of a long journey, in a climate heated by a scorching sun, he took special care to protect it as much as possible from external influence. He sent some on lancets of silver, silver-gilt and ivory; he also impregnated some English lint with the vaccine fluid, and enclosed it between glasses; and when he had properly secured them he dipped them at a wax-chandler's till they formed a solid ball, which he enclosed in a box filled with shreds of paper. In this state the packet was safely conveyed across the Bosphorus, and passed over the whole line of deserts; and he had the satisfaction of hearing that, on its arrival on the banks of the Tigris, its contents were still liquid and succeeded on the first trial. It was received on the thirty-first of March, 1802, upon the banks of the Tigris, and before the end of June it had reached Bombay.

Dr. De Carro, in a letter to Dr. Jenner, dated Vienna, April 22, 1803, thus describes the method which he had employed for the preservation of the vaccine virus:

> "I do not know whether you are well informed of the great improvement which MM. Ballhorn and Stromeyer have made to the glasses invented by you. They have taught us a simple and easy manner to preserve the vaccine lymph fluid during an indefinite term. The Hanoverian vaccinators take a small bit of English *charpie*, which you call, I believe, *dry lint*. The quantity must be, of course, equal to the concavity of the glass. The pustule then is punctured by a circular or half-circular incision with the lancet, so as to open a greater number of the cells forming the vaccine pustule covered with the same pellicle. The lint is applied upon the pustule on the most wooly side, so as to act better as a syphon. It pumps in a very short time a sufficient quantity of vaccine fluid to saturate it as completely as if it had been dipped in a glass of water, particularly if the lint is now and then gently pressed with the point or back of the lancet. When it is quite full you take it with the lancet and place it carefully in the cavity of the glass; you put a drop of oil, or a little mucilage, upon the internal surface of the glasses; you make the flat bit of glass slide upon the *charpie*, so as to exclude the air as much as possible; you tie the two bits with thread, and seal the edges. To prevent the access of light I commonly fold it in a black paper, and when I was desired to send it to Bagdad, I took the precaution of going to a wax-chandler's, and surrounded the sealed-up glasses with so much wax as to make balls. With this careful manner it arrived *still fluid* on the banks of the Tigris." (*Life of Edward Jenner, vol.* 1, *pp.* 420, 430.)

The method so extensively employed in America, of preserving the entire scab after it separates from the arm, by enclosing it in wax, is not only less reliable than the method practiced by Drs. Jenner and De Carro and others, but it is attended with greater danger, from the changes induced by heat and moisture.

Shortly after the introduction of vaccination into the United States, by Dr. Waterhouse, ignorant persons, in New England, not of the medical profession, who were stimulated by avarice to carry on a traffic in vaccine matter, obtained the shirt-sleeves of patients which had been stiffened by the purulent discharge from an ulcer consequent on vaccination. These they cut into strips, and sold about the country as impregnated with the true vaccine virus. Several hundred persons are said to have been inoculated with this poison, which in some cases produced great constitutional disturbance.

SECTION V—THE MINGLING OF THE VACCINE VIRUS WITH THAT OF THE SMALL-POX—MATTER TAKEN FROM THOSE WHO WERE VACCINATED WHILE THEY WERE LABORING URDER THE ACTION OF THE POISON OF SMALL-POX, WAS CAPABLE OF PRODUCING A MODIFIED VARIOLA, AND COMPARATIVELY MILD DISEASE IN THE INOCULATED, AND WAS CAPABLE OF COMMUNICATING BY EFFLUVIA SMALL-POX IN ITS WORST CHARACTER TO THE UNPROTECTED—OBVERVATIONS OF DRS. JENNER, WOODVILLE, ADAMS, WILLAN, GREGORIE, HENNEN, FOWLER AND BOUSQUET, UPON THE RELATIONS OF THE VACCINE DISEASE AND SMALL-POX.

In more than one instance small-pox was disseminated, by vaccination with what was considered as vaccine virus. In all such cases the virus was obtained from patients who were laboring under the action of the poison of small-pox, at the time of the insertion of the vaccine matter. Some cases of small-pox were said to have originated from the employment of small-pox scabs, which had been sent through the lines by the enemy as good genuine vaccine matter. As far as my knowledge extends, such accidents did not arise from the willful and malicious dissemination of small-pox matter, as was charged publicly through the newspapers; but they were referable to the careless employment of vaccine matter derived from patients in small-pox hospitals, or from members of households vaccinated after small-pox had appeared in their midst, and consequently after the introduction of poison into their systems.

Such accidents are by no means new to the profession, for, more that half a century ago, they had well nigh proved fatal to the infant cause of vaccination. Many of the patients experimented upon, by Dr. Woodville, at the Small-Pox Hospital in London, were not only exposed to a variolous atmosphere, but they actually had small-pox matter inserted into their arms on the third and fifth days after vaccination. Dr. Jenner had positively asserted that pustules do not belong to the cow-pox: Dr. Woodville, on the contrary, affirmed that three-fifths of the patients whom he had inoculated with vaccine matter, had pustules not to be distinguished from variolous ones. Dr. Woodvile, in an interview which he held with Dr. Jenner on the twenty-third of March, 1798, mentioned that the cow-pox had been communicated by effluvia, and that the patient had it in *the confluent way*. Dr. Jenner is said to have remarked on this marvellous occurrence, "Might not the disease have been the confluent small-pox communicated by Dr. Woodville, as *he* is always full of the infection?"

Such careless experiments as those of Dr. Woodville, conducted in a *small-pox hospital!* excited the strongest feelings of disappointment among the principal medical men of London, and for a season threw doubt upon the accuracy of Dr. Jenner's statement. And it was only after careful investigation that Dr. Jenner was able to demonstrate *that the London cow-pox was somehow or other compounded with small-pox.*

This contaminated matter from the London small-pox hospital, was distributed to different parts of the country by Dr. Pearson, and caused most unpleasant accidents. Some of this contaminated matter fell into the hands of Mr. Andre, Surgeon at Petworth, and fourteen persons who were inoculated with it had variolous eruptions and in some cases suffered severely. Lord Egremont wrote a long letter on this occasion to Dr. Jenner, detailing the occurrence at Petworth. The reply of Dr. Jenner to this letter is worthy of careful consideration, in the light which it throws upon similar accidents occuring during the recent war.

DR. JENNER TO LORD EGREMONT.

My Lord—I am extremely obliged to your Lordship for your kindness in giving me so fully the account of the late inoculation at Petworth; a subject which, before, I did not clearly understand; and which, of course, had given me much vexation. I will just briefly lay before you part of the history of the cow-pox inoculation since my experiments were first publicly made known, which may tend in some measure to explain in what manner pustules may be produced.

About a twelvemonth ago, Dr. Woodville, Physician to the Small-pox Hospital, procured some virus from a cow at one of the London milk farms, and inoculated with it several patients at the Small-pox Hospital. Fearful that the infection was not advancing properly in some of their arms, he inoculated them (some on the third, others on the fifth day afterwards,) with small-pox matter. Both inoculatiens took effect; and thus, *in my opinion*, a foundatien was laid for much subsequent error and confusion; for the virus thus generated became the source of future inoculations, not only in the hospital, but in London, and many parts of the country.

Hearing a murmur among medical people that the cow-pox was not the simple disease I had described, but that in many instances it produced as many eruptions and was attended with as much severity as the small-pox, I went to town with the view of inquiring into the cause of this deviation. Dr. Woodville at once invited me to the Small-pox Hospital, and very ingenously told me the whole of his proceedings.

The inoculated patients were shown to me, and though some were, without eruptions and exhibited the appearance of the true cow-pox, others were very full of them, and I could not discern any differences between them and the perfect small-pox. I therefore did not hesitate to tell the Doctor that it clearly appeared to me that the small-pox had crept into the constitution with the cow-pox; that I did not consider them as two distinct diseases, but as *varieties* only of the same disease; and therefore they might co-exist in the same constitution, and that thus a mixed disease had been produced. I communicated also the same sentiment to Dr. Pearson, who was then, and had been, busily employed not only in inoculating from this source, but in dispensing threads embued in the virus to various places in our own country, and to many parts of the continent. Forseeing what was likely to ensue from these hasty measures, I remonstrated against them, but was not listened to. In many places where the threads were sent a disease like a mild small-pox frequently appeared; yet, curious to relate, the matter, after it had been used six or seven months, gave up the variolous character entirely, and assumed the vaccine; the pustules declined more and more, and at length became extinct. I made some experiments myself with this matter, and saw a few pustules on my first patients; but in my subsequent inoculations there were none. From what I once saw at the hospital, I had reason to think that some of these threads sent out were not only stained with small-pox matter from the contamination spoken of, but that they had sometimes a dip in a real small-pox arm; as the patients were all mingled together at the hospital, and stood with their arms bare, ready to afford matter one among another. Without making any further trials with matter from the cow managed in another way, Dr. W. published a volume containing the result of his practice, which certainly dampened the spirits of many who had from my represention taken up a high opinion of the cow-pock inoculation. A thought now struck me that, if possible, it would be proper to procure matter from a London cow, and compare its effects with that generated in the country.

Unwilling to determine in a hurry, I procured matter from a London cow, conceiving it possible that the animal in this situation might generate matter possessing qualities differing in some measure from that which is more in a state of nature in our meadows here; but the result convinced me that the virus was the same, as 500 people were inoculated from this source without the appearance of any pustules. But this history, my lord, does not tell you by what means the pustules appeared at Petworth; but it informs you how errors may arise, and how they may be persisted in, There is another source which I fear will be too common. Lancets are often carried in the pocket of a surgeon with small-pox dried upon them, for the purpose of inoculation. A gentleman some time ago sent a lancet here to have it charged, as it is called, with cow-pox matter; perceiving it stained at the point with some dried fluid, it was sent back, when he immediately recollected that his lancet was prepared with the matter of the small-pox. What confusion might have happened from this; and how narrowly we escaped it! For it was but an equal chance, probably, that had the lancet been used a direct small-pox might have been produced, for the chances were equal whether it produced one disease or the other.

It may be necessary to observe, it is improbable that a mixture of the two matters used in this way would have produced a mixed disease, as two different diseased actions cannot go forward in one and the same part at the same time, so that the disease would have been either the perfect cow-pox or the perfect small-pox.

The matter which was made use of, I hear, came from Dr. Pearson; and doubtless Mr. Keate will have candor, and, I hope, industry enough to trace the error to its source. That there was error somewhere, of which Mr. Keate became the innocent cause, is a fact that I think will not admit of controversy. I have sometimes seen, perhaps in one case in a hundred, a few scattered pimples about the body and sometimes rashes; but these have arisen from the inflammation and irritation of the arm, for it is very well known that many acrid substances, applied to the skin, so as to produce local inflammation, will frequently occasion a similar appearance.

This letter, in which Dr. Jenner announces the doctrine held and taught by his friend John Hunter, (viz., two diseased actions, cannot go forward in one and the same part, at the same time), is important not only in the demonstration which it affords of the transmission of both small-pox and cow-pox, at the same time, through the same mass of matter, but it also contains a strong argument for the view held by Jenner that these were not distinct disease, but only *varieties* of the same disease.

Dr. Adams, in his work on Morbid Poisons, gives the following interesting and important observations, which confirm the correctness of the views of Dr. Jenner.

"It is to be hoped that a very correct attention to the processes of variolation and vaccination will enable us to ascertain the exact analogy which exists between the two morbid poisons evidently distinct, yet not entirely separated by those laws which we have to trace in others. The correspondence in the laws of each—the peculiarities in which they differ—the manner in which they interrupt each other's action, and the manner in which they may be made to act in concert, are all equally interesting, and the daily subjects of experiment and observation. At present the following may be considered as established facts:

"Each, when inserted, requires about the same time to produce its local effects.

"A subject, that has regularly passed through either, is insensible to the future constitional effects to the variolous poison.

"Each will produce secondary eruptions, having the same property of infecting as the primary; but the secondary eruptions appear more than ninety-nine times in a hundred in small-pox, and not once in three hundred, if the skin is otherwise entire, in the cow-pox.

"In the small-pox, secondary pustules appear whilst the primary is advancing, and maturate two or three days after them. In cow-pox, when secondary vesicles appear, it is not till the primary has begun to scab.

"The small-pox may infect by the effluvia, the cow-pox can only be communicated by the secretion from the local infection.

"When these poisons are inserted at the same time in the same part of the same subject, by mixing the secretion of each, only one will produce its effect.

"When inserted separately in different parts of the same subject, each will produce its local effect, and at the same time.

"If cow-pox is inserted at the same time that the subject is exposed to a vitiated atmosphere, the former will supersede the effects of the latter. If inserted four days later, the effect will be less certain, but as far as can be ascertained, not more uncertain than the variolous insertion." (Adams on Morbid Poisons, pp 10-16.) Dr. Adams gives several instances to show that the vaccine and variolous diseases may be confounded in certain cases, that is, that the laws peculiar to one may occasionally influence the other. (See pp. 16-20.)

"The invaluable Jennerian discovery has introduced us to a morbid poison, the properties of which are different from all others that we are acquainted with in superseding the constitutional susceptibility to another. As such a law as this is unknown in any other two morbid poisons, we might suspect the analogy between these two would be clearer than between any other two. We might even expect that the characters of the two might be altered by applying both at the same time, and also that the phenomena of one might imitate the other in such a manner as to render the distinction between the two often doubtful. It is, therefore, rather a matter of surprise that the distinction should be so regularly reserved, and the laws which separate other morbid poisons so rarely infringed.

"The next thing I would remark is that small-pox and cow-pox, contrary to the law of all morbid poisons, which are different in their action, will proceed together in the same person without the smallest interruption of each other's course. If inserted nearly at the same time, in the same person, each proceeds in the same course as if it were in two different subjects; if inserted nearly in the same spot, the two form one common areola, but the vesications are distinct, and each preserves its own character, till that of small-pox becomes purulent from suppuration for the separation of the slough. If secondary pustules follow from the small-pox, and they should continue coming out till the cow-pox has completed its progress, its vesicle, like any other inflamed part, will become the seat of a small-pox pustule, or the whole vesicle will become purulent, contrary to its legitimate character. In the first case, you may take small-pox matter from the pustule, which, by the adhesive inflammation, will remain distinct from, though seated in part of the vaccine vesicle; and from the other parts of the vesicle you may take the vaccine matter, and each will perpetuate its respective morbid poison. If the whole vesicle becomes purulent it is a variolous pustule, and will inoculate small-pox.

"It was remarked by Dr. Woodville that if a person is inoculated with small-pox to-day, and three or four days after is reinoculated with the same morbid poison, though the last insertion may remain a smaller pustule than the first, yet both inoculations will arrive at their height at the same time. The same takes place in cow-pox; and also, if a person is inoculated to-day with cow-pox, and three or four days after with small-pox, or to-day with small-pox and three or four days after with cow-pox, the two insertions, though the last may remain smaller than the first, will maturate and scab at the same time.

"By these facts it appears, first, that a marked kind of small-pox may be perpetuated. If, therefore, the cow-pox is a marked kind of small-pox, there can be no reason why it should not have been perpetuated with its true character; and that the cow-pox is such, appears, secondly, by its not being interrupted by, and not interrupting the progress of small-pox, and by both retaining their respective laws and characters at the same time, whether inoculated separately in different subjects, or the same; or if each has been inoculated in the same subject at different times, the consequence is similar to the inocution of either one, at different times.

"These experiments have been repeated so often, as to leave no question concerning the law. The same experiments have been repeatedly tried with small-pox and measles, and also with cow-pox and each of the others, yet these interruptions have always followed, which have been remarked in the early part of the work.

"As, therefore, a marked variety of small-pox is capable of preserving its distinct character under inoculation, there seems no reason why the cow-pox should not be among such varieties; and as any of the known varieties will destroy the susceptibility to the disease in all other forms, so there is no reason why cow-pox, if among the varieties, should not do the same; and there is the more reason to expect this, because, contrary to any morbid poisons, the action of small-pox and cow-pox are maintained at the same time in different parts of the constitution, subject respectively to similar laws, whether only one or both of them are applied in any variety of forms.

"It may be said that small-pox is an eruptive disease, whilst cow-pox, though affecting the constitution, is only confined in its local action to a single part. But small-pox is sometimes, we have seen, equally confined in its local action, and principally in those cases in which its appearance most resembles cow-pox. It is not less certain that cow-pox, on some occasions, produces secondary eruptions. Besides the cases I have seen myself, the Rev. Mr. Holt (*Med. and Phys. Journal*) gives an account of full eruption of vesicles, which had the same properties of contagion as the inoculated part. The Rev. Mr. Fermn saw a few scattered in different parts." (*Adams on Morbid Poison*, pp. 398–401.)

Dr. Willan found "that when a person is inoculated with vaccine and variolous matter about the same time, (that is, not exceeding a week,) both inoculations proved effective, for the vaccine vesicle proceeded to its acme in its usual number of days, and the maturation of the variolous pustule was attended by a variolous eruption on the skin." (On vaccine Inoculation, p. 1.)

When cow-pox is inserted during the incubative stage of the casual small-pox, while the small-pox is still latent, the vaccine vesicle for the most part does not advance, or advances tardily and imperfectly. There are exceptions, however, to this rule, and cow-pox and casual small-pox may sometimes be seen running their full course at the same time. In no case, however, does the cow-pox so inserted alter or modify the course of the small-pox. When the variolous and vaccine fluids are inserted into the arms on the same day, each disease occasionally proceeds, preserving its original character. At other times, however, they mutually restrain and modify each other. The vaccine vesicle is smaller than usual, and irregular in its progress, while the variolous pustules which follow are of the kind denominated *variolae verrucosae*, vulgarly swine-pock, stone-pock, or horn pock (*Willan on Vaccine Inoculation, p. 5*); that is to say, they are hard and shining, surrounded with little inflammation and they suppurate imperfectly. The small quantity of matter they contain is absorbed, leaving the cuticle horny and elevated for many days afterwards. Upon the extremities the eruption does not pustulate at all, but is minute and papulous, and terminates by desquamation. It will be found in most cases that even though the eruption be modified in its character, there is, nevertheless, considerable disturbance of the general system under the joint influence of the variolous and vaccine poisons.

Dr. Woodville has said that if the cow-pox matter and the small-pox matter be both inserted in the same arm of a patient, even within an inch of each other, so that on the ninth day the same efflorescence becomes common to both the local affections, nevertheless inoculating from the cow-pox tumor the genuine vaccine disease will be produced (*Observations on the Cow-pox, p.* 12); but if the inoculation be performed with a mixture of the two matters, then the chance is equal that small-pox or cow-pox will be the result, or the varioloid disease.

When the insertion of the vaccine lymph *precedes* that of the variolous by a period not exceeding four days, both diseases advance locally. Sometimes an eruption of small-pox papulæ follows. At other times the variolous fever is slight and unaccompanied by eruption. Under these circumstances matter taken from the primary vesicles shall sometimes communicate cow-pox and small-pox respectively, but more commonly the variolous poison predominates, and contaminates the lymph of the vaccine vesicle. It was ignorance of this phenomenon, in the mutual action of the vaccine and variolous poisons, which occasioned Dr. Woodville's mistakes at the small-pox hospital in 1799.

Variolous matter inserted into the arm at any period not exceeding a week from the date of vaccination will take effect and be followed by a pustule. After that time no effect is produced.

When small-pox inoculation precedes by three or four days the insertion of vaccine lymph, the vaccination advances, but after the tenth day the fluid in the vaccine vesicle becomes purulent; and in that state will communicate small-pox. (Willan on Vaccine Inoculation, p. 8; also Dr. George Gregorie's valuable article on Vaccination in the Cyclopædia of Practical Medicine.)

Dr. Denby, whilst admitting that the period of incubation of variola may be somewhat undefined, as in the case of other animal poisons, concludes that, nevertheless, from experiments, a fair conclusion may be formed as to the usual period of this incubation, when prophylaxis may be induced. And from these Dr. Denby judged that, if on the third day, before the onset of erethism, rigor, and headache, perfect lymph be inserted, prophylaxis is almost certain, assuming three or four days for the premonitory symptoms before the variolous point or papula appears. The vaccine vesicle will then be eight or nine days old, the areola will be becoming indurated, and erethism will exist. Dr. Denby considers that in this fever against fever, the essence of prophylaxis really exists. If under this influence the variolous papula proceeds, it will resemble umbilicated varicella or horn-pock. If the vaccine be used two days later, especially if there be bronchial or pulmonary symptoms present, it will be useless. The papula may be just apparent, but it will be blighted. There are, of course, exceptions to this rule. A woman was delivered, says Dr. Hennen, while suffering from confluent variola; the infant was vaccinated a few hours after birth. The mother died on the eleventh day; the infant had true vaccine and lived. *Med. Times*, October 25, 1851.*)*

In an analagous case, reported by Mr. T. C. Beatty, of Durham, the child delivered from a mother in whom the variolous pustules made their appearance during labor, was not vaccinated until the morning of the fourth day after its birth. True vaccine was the result; and yet, on the eighth day after she was vaccinated, when the vesicles were fully matured, the little patient was very ill, and showed signs of eruption under the skin, which proved to be *confluent* small-pox, of which the little creature died four days after. (London Lancet, 1852.)

Dr. Robert Fowler, of the Loughborough Dispensary, and Mr. Robert Tod, of Gilmore Place, Edinburgh, (London Lancet, 1852); MM. Herard and Bousquet, (L'Union Médicale, Nos. 108, 109, 110, Bulletin de Thérapeutique, tome 35, pp. 342-52), and others, have recorded cases proving the possibility of the simultaneous existence of small-pox and the vaccine disease, and confirming the correctness of the conclusions of Jenner and the older observers.

M. Bousquet goes so far as to deny that the two eruptions, variola and vaccinia, exert any reciprocal reaction, and the nearer they appear together, the more independent are they of each other. Suppose for example, that they could appear at the same hour, then each would pursue its ordinary course, just as if the other were not present. But supposing the one eruption appears after the other, all will depend upon the space of time separating them. If this be only some hours, or even two or three days, all passes on as just stated. The case is different when one of these eruptions is greatly in advance of the other. If this is not to such an extent as to exclude, the eruptions progress together, but not in parallel. The most advanced always keeps its advantage, and finishes at its ordinary epoch, without having undergone any change in form or duration. The other follows it at a distance, but after the variolous capacity of the subject has become exhausted by the first, the second dies away.

In these influences, M. Bousquet considers that there is nothing direct, active or special; they are the consequences of the faculty possessed by the eruptions of supplying or substituting each other. The vaccinia does not arrest the variola, but it is the variola that stops short in the face of the vaccinia: and, conversely, variola does not cut short the course of vaccinia, but this last interrupts its own course in presence of the variola. It is the right of precedence, and the more widely the two eruptions are separated, the more readily do they exclude each other, while the nearer they are together, the more independently do they proceed. Considered in themselves, the vaccine and variolous virus are so little capable of destroying each other's energy, that if they are mixed together, and inoculation performed with the mixture, M. Bousquet affirms that two perfectly distinct eruptions may be produced.

Considered as regards their effects, therefore, according to this view, it cannot be said that vaccinia *cures* variola, or even, rigorously speaking, *prevents* it. It takes its place, stands in its stead, and is neither more nor less than a substitution. Thus, so far from explaining the operation of vaccinia by the supposed opposition it offers to variola, we would rather do so by the analogy and reciprocal action of the two diseases. (Bulletin de Thèrapeutique, tome 35, pp. 342-52; also, the British and Foreign Medico-Chirurgical Review, April, 1849.)

From the facts recorded in this section, we deduce the practical conclusions:

First—That vaccine matter derived from the patients of small-pox hospitals, or from those in civil or military practice who have been exposed to the contagion of small-pox, should never be used for the propagation of the vaccine disease.

Second—The vaccine disease is not a distinct disease from small-pox, but a variety or modified form of the variolous affection.

SECTION VI.—DRIED VACCINE LYMPH OR SCABS, FROM PATIENTS WHO HAD SUFFERED WITH ERYSIPELAS DURING THE PROGRESS OF THE VACCINE DISEASE, OR WHOSE SYSTEMS WERE IN A DEPRESSED STATE FROM IMPROPER DIET, BAD VENTILATION, AND THE EXHALATIONS FROM TYPHOID FEVER, ERYSIPELAS, HOSPITAL GANGRENE, PYÆMIA, AND OFFENSIVE SUPPURATING WOUNDS—DR WM. GERDNER, OF GREENE COUNTY, TENN., ON THE RELATIONS OF ERYSIPELAS TO VACCINATION—CASES OF ERYSIPELAS FOLLOWING VACCINATION—VIEWS OF DR. PAUL F. EVE, ON THE POSSIBILITY OF INOCULATING ERYSIPELAS BY VACCINATION—DR. J. C. NOTT, OF MOBILE, ALA., ON ERYSIPELAS—REPORT OF DR. J. F. BELL, OF VIRGINIA—REPORTS OF SURGEON HUNTER McGUIRE OF VIRGINIA, AND OF OTHER PHYSICIANS.

In several instances during the revolution death resulted from phlegmonous erysipelas following vaccination in apparently healthy patients, in both civil and military practice.

It was believed that in some cases the poison of erysipelas was conveyed along with the vaccine virus.

In one instance which came to my knowledge, the lives of several negro women and children were destroyed by erysipelas excited by vaccine matter taken from the same scab, and a stout healthy white man who was vaccinated with the same matter, and by the same physician who vaccinnaated the negro (on a neighboring plantation), was extremely ill from the effects of the poisonous matter, and barely escaped with the loss of a large portion of the muscles of the arm.

I was informed upon good authority that the matter caused the death of a pregnant negro woman, and of another negress and her young infant, of some week or ten days of age, at the time of the inoculation of the vaccine virus.

The following observations relating to erysipelas following vaccination, were placed in my hands, by Dr. Frank A. Ramsay, of Memphis, Tennessee:

COMMUNICABILITY OF SYPHILIS BY VACCINATION. BY WILLIAM GERDNER, M. D., OF GREEN COUNTY, TENNESSEE.

I notice in the Medical and Surgical Monthly, June, 1866, an article taken from the Richmond Medical Journal, June, 1866, by William Fuqua, M. D., Appomatox County, Virginia, on the communicability of syphilis by vaccination.

About the same time referred to by Dr. Fuqua, I had numerous cases of vaccination, in the district of my practice, presenting abnormal features. The people believed it to result from syphilis, and called the exhibitions by that name. I made close scrutiny of the cases occurring under my observation, and concluded that they were not syphilitic in origin or manifestation. I regarded them as erysipelas, presenting the form called phlegmonous, for which opinion I thought I had reasons. Many cases assumed the form of common erysipelas, invading limited portions of the arm, and in some few cases the whole surface of the vaccinated limb was affected.

The proper distinction for the practical physician of erysipelas, is superficial and deep-seated—ordinary or common erysipelas affecting the cuticle proper—deep seated or phlegmonous erysipelas involving the tissues, particularly the cellular. At present the cause of the difference is inexplicable—why in one case serum, and in the other lymph is poured out, remains a question, while the fact exists. Each distinct inflammation has its habits.

As far as my knowledge extends, the records of medicine do not afford any very large collection of cases of erysipelas supervening upon vaccination. The following are the most important cases of the apparent excitation of erysipelas by vaccination, which were noted in the works and journals consulted during these researches:

Diffuse Cellular Inflammation following Vaccination.—The first was that of a female child, aged five years, who had been vaccinated by a respectable practitioner in Dublin. This child was brought to the physician who reports these cases, about three weeks after it had been inoculated. The arm was then greatly swollen, the swelling extending to the hand; the integuments of the upper arm were of a dusky leaden hue, and a large black slough occupied the situation of the usual crust of the vaccine vesicle. The child's pulse was weak and slow, not exceeding sixty-four. The extremities were cold, tongue dry and coated. There were extensive sloughing and hemorrhage from the mucus membrane of the mouth. The integuments of the cheeks adjoining the commissure of the lips were of a livid hue. The respiration was very much hurried, but no physical sign of disease could be detected in the chest.

The child's parents stated that these formidable symptoms first presented themselves, between the ninth and twelfth day from that on which it had been vaccinated. The practitioner who inoculated the child affirmed that up to that period, the vaccine vesicle ran a healthy course and that he had vaccinated other children with the same lymph in whom the course of the vesicle was perfectly regular. This child was of a delicate constitution, having suffered with attacks of scrofulous ophthalmia, pneumonia, and bronchitis. Its health was said to be good, at the time it was inoculated. Complete recovery, though very slow, was effected in this case by the use of mild tonics and stimulants.

The second case was that of a male child, aged eighteen months, who was also vaccinated by a physician of Dublin. About the twelfth day from the period on which it was vaccinated, the arm was attacked with severe inflammation of the erysipelatous character, the vaccine vesicle having, up to that day, according to the statements of the parents, run a regular course. On the sixteenth day, a dark slough, as large as a shilling occupied the situation of the vesicle; the entire extremity was immensely swollen; the integuments of the upper arm were of erysipelatous redness, and such of them as were in the immediate neighborhood of the slough were quite livid. The attending fever was of the inflammatory type, the skin being hot, tongue furred, pulse rapid and full, and the thirst great. Until the fever was subdued by cooling and alterative medicine, and the local inflammation relieved by the application of poultices and formentations, the sloughing spread with the most alarming rapidity. After the sloughs had separated, and the progress of the gangrene arrested, a large and deep ulcer remained with undermined edges, at the bottom of which the muscles of the arm could be distinctly observed; so extensive was this ulcer, that it was not healed for three months, though the case progressed most favorably in every respect."—*Dublin Journal of Medical Sciences*, 1844.

Dr. Greene reported to the Boston Society for Medical Improvement, a fatal case of erysipelas, following re-vaccination, which occurred in January, 1846.

The patient, a gentleman sixty-four years of age, had been vaccinated twenty years before, and re-vaccinated, though without success, two or three times since. On Friday, the day after the re-vaccination by Dr. Greene, he was seized with chills, nausea, and a sense of general uneasiness; and, at the same time, inflammation commenced in the arm, attended by heat, redness, and pain. He slept none on the following night, and on the next night was attacked with vomiting and purging. The symptoms from this time did not become materially worse, however, till the following Wednesday, when he complained of pain just below the elbow; and on Thursday, a small patch of erysipelas was discovered at this point, which gradually extended over the arm and chest of the affected side, the infiltration of the cellular tissue, keeping about two inches ahead of the redness. He died at ten on Friday evening, a little more than eight days from the time of re-vaccination, the erysipelas having extended to within two inches of the sternum. In regard to the quality of the matter introduced, Dr. Greene remarked that it was taken on the eighth day from a perfectly formed vesicle, on the arm of a perfectly healthy infant, born of healthy parents; that one of his own children had been vaccinated with the same matter, and also another person, in both which cases, the symptoms and appearances were slight.

It is said that in 1849 and 1850, erysipelas so frequently followed vaccination in Boston, and the result was so often fatal, that many physicians refused to vaccinate, except when it was absolutely necessary, and almost entirely abandoned re-vaccination. Cases were reported to the Boston Society for Medical Improvement, by Drs. J. B. S. Jackson, Cabot, Bigelow, Homans, Putnam and Channing. From the transactions of this society we select the following cases:

Case Reported by Dr. Cabot.—This being a case rather of diffuse cellular inflammation than common erysipelas. The patient was a gentleman, sixty-nine years of age, who having been exposed to varioloid, was re-vaccinated in two places on the third of April. On the second day, two vesicles had formed about the size of a small pin's head, and there was pain in the axilla, with pain and soreness under the pectoral muscles. In about two weeks the inflammation had extended to the hand, and in the course of the third week an opening was made about the elbow, from which a considerable quantity of sero-purulent fluid was discharged; the back of the hand being opened down to the fascia a few days afterwards. From the shoulder the erysipelas extended over the whole back, down the right arm to the elbow, and somewhat over the abdomen from each side; also across the front of the chest, nearly to the right shoulder. The whole duration of the erysipelas in an active form was about seven or eight weeks; neither the hand nor lower extremities were affected; the areola about the vaccine points subsided, but subsequently the surface was attacked with the disease. The suppuration about the left shoulder and down the upper extremity had been very extensive; the pectoral muscle was separated from the parietes of the chest, and the skin of the forearm was so detached from the subjacent parts that fluids thrown in at the elbow would pass out at the back of the hand; very numerous openings have been made about the elbow and shoulder for the discharge of pus. For about two months the patient was confined to his bed, and convalescence was tedious. The prostration was not so great as would have been expected in such a case; the pulse not rising above ninety during the active stage of the inflammation; there was, however, some delirium, with chills, headaches and pain in the back. No suppuration occurred, except in the parts above alluded to.

Case Reported by Dr. J. Bigelow.—This patient was a gentleman, about thirty years of age, and having been exposed to small-pox, was re-vaccinated with several others, from the same virus. Two days afterwards, an erysipelatous spot, of the size of a dollar, was discovered around the point of vaccination. This spread rapidly in every direction, and at the end of five days, had occupied the whole arm from the shoulder to the elbow.

this time, several dark spots appeared upon the inside the arm, which in two days were perfectly gangrenous, so that an incision was made five inches in length, without pain. The slough was apparently confined to the skin and cellular substance, inasmuch as the muscular power was at no time lost. Meanwhile the pulse was quick, and the skin hot, with prostration, headache and delirum. In another week, the erysipelas had extended to the whole trunk, half way down the thigh, and to the wrist of the affected arm; the patient being much of the time delirious, or somnolent, and with a pulse of 120. During the third week, the symptoms were greatly aggravated, and the cerebral affection increased; there was also a retention of urine, and the catheter was required for a fortnight. During this time, however, the slough gradually separated, leaving a large, deep ulcer. The patient became convalescent at the end of a month, and slowly recovered; the ulcer requiring another month or more to cicatrize. No other person, who was vaccinated with the same virus, had any unusual symptoms; but a lady of the family, about seven weeks after the vaccination, was attacked with inflammation of the fauces and tonsils, followed by protration and delirum, and died in a week; during her sickness a livid spot, about two inches in diameter, appeared over the upper part of the sternum, but this disappeared before death.

In another case reported by Dr. Bigelow; a healthy child about five months old, was vaccinated, and the vesicle went on well until the ninth day, when the arm became erysipelatous, the inflammation rapidly spreading over the whole trunk; and the child died in a few days. On the eighth day of the vesicle, the day before the appearance of the erysipelas, matter was taken with which three others were vaccinated, and these patients had perfect vesicles without any anomalous symptoms

Case Reported by Dr. Homans.—The patient was a healthy infant, about three weeks old. On the eighth day, the vesicle appeared well, and matter was taken with which other children were vaccinated, the result being in every case successful. On the tenth day, erysipelas appeared below the elbow, and extended into the axilla; the swelling and redness very defined, and the inflammation spread rather more rapidly than is usual in the adult. Vomiting and diarrhœa came on, and lasted some days; the pulse was too quick to be counted. The head and abdomen then became affected, and on the ninth day from the invasion of the disease, the scrotum and penis were greatly swollen; these last were punctured with much relief, but a deep sloughing of the scrotum took place, one and a half inches in diameter, and nearly exposing the testicles. The extremities were next affected, but in the mean time the child began to improve, and the pulse had fallen to 120. On the subsidence of the disease, abcesses formed upon the body and limbs beneath the surface, and about the left hip, one that was quite large and deep. This last, is the only one that remains open, and the child is fairly convalescent, after a sickness of about three months.

Dr. Channing mentioned a case of erysipelas after vaccination in which the shoulder, axilla and pectoral muscles were involved. (The American Journal of Medical Sciences, October, 1850—pp. 318-321.)

Dr. Charles E. Buckingham, Physician to the Boston House of Industry, has also published an interesting case of "Constitutional Irritation following Vaccination," from which we make the following abstract:

B———, a farmer, twenty-five years of age, of previous robust health, vaccinated on Thursday, August 28, 1849.

September first, he took an emetic, and on the second a cathartic dose. Both operated freely. Dr. Buckingham was first called to him at nine P. M., September 3. At this time the patient presented the following conditions: Complete anorexia; great thirst; headache; sleeplessness; pain in back; eyes and hearing normal; urine free; pulse 150, full and strong; decubitus dorsal. His late vaccination was not known at this time. Got a saline mixture, consisting principally of bicarbonate of soda and chlorate of potassa.

Fourth.—Febrile action less; has pain in calf of right leg; no tenderness, redness, swelling or heat.

Ninth.—Pulse, 84; appetite good. No sleep last night on account of the pain in the calf, and in the sole of the right foot; has had a sinapism to the foot, with partial relief; no dejections for twenty-four hours; whole of right calf swollen; a circumscribed red spot one and a half inches below head of right fibula, covering about two inches.

Tenth.—Patient was seen, in consultation, by Dr. H. G. Clark. Redness more diffused; leg much swollen, and œdematous from knee to heel; pain confined to spot of yesterday, which is, for the first time, tender; no headache or thirst; eyes and hearing normal; neither delirum nor sighing; no appetite; tongue red at its top, and in other parts covered with a thick creamy paste; pharynx the same; pulse, 88, full.

Thirteenth, 9 A. M.—Pulse, 100, full and soft; dejection. Attention was called to a hard, red, circumscribed swelling on the left forearm, similar to the others; in examining which, found the remains of an irregular vaccination, of which Dr. Buckingham first learned the date as given above.

Sixteenth.—Swelling of right leg decidedly less; that of the left leg hard, red, and excessively tender. The right elbow was red and swollen. The right eye red, swollen and painful about the orbit; no conjunctival redness; tears trickling over face; pulse 120, full, soft, dicrotic; respiration slow and distinct, with occasional sighing; no delirium; tongue perfectly steady, when protruded; face somewhat livid; no dejection for two days, except from enemata.

Eighteenth.—Had a good night; pulse 112; respiration 16; nose much swollen, dusky, red and painful; about a dozen papules, hard, red and shot-like, scattered over forehead, face, back and legs; no glandular enlargement. 12 M., a few more papules on abdomen; the others are becoming pustular, and a few are umbilicated.

Nineteenth, 8:30 A. M.—Two dejections, with urine; tongue dry, black and cracked; redness and swelling of whole upper face; papules increasing in number, and pustules in size; a few of them umbilicated; no glandular enlargement.

Twentieth, 10 A. M.—Pulse 120, more firm, but not so full; respiration 32, labored, no rales; numerous black, pasty dejections; took dose of brandy in the night; restless, and occasionally wandering; easily aroused, and speaks sensibly, but soon falls asleep again; pustules increasing in size and number, some of them as large as good-sized peas; knuckles of right hand swollen; both sides of face red, swollen and œdematous; right leg of normal size, and appears well; left leg the same, with the exception of slight tenderness; swelling of left forearm soft and fluctuating; no glandular enlargement, nor mark of absorbents. 9 P. M., constantly delirius; unable to drink; frequent involuntary dejections and urine; hands tremble, pulse 134, feeble; respiration 36, noisy and husky; sounds and impulse of heart normal; many of the pustules drying; scab of vaccination came off arm; erythema and œdema of scalp.

Twenty-first, 10 A. M.—Delirious all night; takes nothing; insensible; no dejections; pulse, 134, soft, and moderately full; respiration varies from 30 to 40, occasionally like that in hydrophobic paroxysm; heart's impulse strong; first sound loud, second sound scarcely perceptible.

5:30 P. M.—Died. The body was removed early next day. No autopsy allowed."

As far as Dr. Buckingham could learn, there had been no sick animal on his farm, and so far as known, the patient had had no communication with any such, nor had he any occasion to handle hides.—*The American Journal of the Medical Science*, July, 1850, pp. 96-99.

Many of such unfortunate accidents attending vaccination, may be referred to the peculiarities of individual constitution, upon some condition of ill-health at the time of vaccination, upon the mode of life pursued during the progress of the vaccine disease, or upon some circumstance such as is known to impart a severe character or a fatal tendency to other affections. Thus, it was said, that in the case of Sir Culling Eardley, who died from the effects of vaccination, his health at the time of the operation was not in completely satisfactory condition; and in another case recorded by Mr. Wells, where death followed re-vaccination, that, on a previous vaccination, an unusual idiosyncrasy was manifested by the occurrence of a prostration almost bordering on death.

At certain times the development of erysipelas after vaccination may be traced to the operation of the same cause which occasions this affection after surgical operations of any kind. Thus in October, 1859, erysipelas followed vaccination in a few cases at Parkhurst on the Isle of Wight; and in one of these cases sloughing occurred to such an extent as to render necessary amputation at the shoulder joints. At that time, however, there was a general cause of ill-health in operation, for both typhoid fever and erysipelas were prevailing at Newport, and several cases had occurred at the Barracks. It is well known to every surgeon, that at such times all surgical operations, even the most trifling, are dangerous.

A similar event on a large scale occurred in the French army in 1858 (*Rapport sur les Vaccination en France, pour* 1860 p. 21). On the twenty-ninth of June, 1858, several men were admitted into the hospital with engorgement of the axillary glands, phlegmonous erysipelas of the arm, etc., as the result of a vaccination effected on the twenty-first. Sixty men were vaccinated with every precaution and unexceptionable lymph. The next day one of them was attacked with phlegmonous inflammation of the arm, complicated with typhoid fever, the origin of which was without doubt prior to the vaccination. Three days later another soldier was similarly attacked, and the fourth day seven more, but without the typhoid fever.

M. Larrey, who was sent to inquire into the affair, noted amongst its causes, first of all a very high atmospheric temperature, and, secondly, an unfavorable medical constitution. Erysipelas was prevalent in the town of Florence, where this accident happened, as well as in the hospital, and the men had, moreover, undergone an unusual amount of fatigue on account of an approaching inspection of the troops. It is evident that the mere vaccination was not in fault, since, during four years, more than 12,000 soldiers from the garrison of Paris had been re-vaccinated without any serious accident occurring.

Dr. Tymann has collected into a table a large number of instances in which erysipelas or troublesome ulcerations have followed vaccination in the practice of several British and American surgeons. (American Medical Series, v. 4, p. 134.) The greater number were in children; but then it is to be recollected that vaccination is mostly performed upon children. Of the six adults, two were between sixty and seventy years of age, one was thirty, one was twenty-five, and the seventh eighteen years old. Seven of the cases proved fatal, being attacked with erysipelas on the ninth day in three instances; on the tenth in one; on the eighth in one; on the seventh in one, and in one case the time of attack was not specified. In some of the other cases it occurred on the second, third or fourth days. The season of the year in which these cases occurred is deserving of notice. Excluding some cases of tendency to troublesome ulceration during the prevalence of a cold northeast wind in the month of May, only three of the whole twelve cases or groups of cases collected were observed during the warmer months of the year. With regard to the cases in the month of May, it is stated that the same tendency to troublesome ulceration declared itself also in persons who were at the same time inoculated for small-pox.

In one case of erysipelas followed by sloughing and necessitating amputation, related by Mr. Chartres, it is noted again that an epidemic tendency to unhealthy inflammation was observed in all cases then in the hospital, so that it became necessary to avoid every surgical operation; and even the punishment of the soldiers by flogging was suspended on account of the erysipelatous inflammation, which occurred whenever the cutaneous surface was injured.

In some cases, however, the occurrence of erysipelas may be clearly the fault of the operator, who uses lymph taken from *a pock too far advanced*, or lymph which has been present in the fluid state so long as *to permit of its decomposition*, or who may have taken it from *a subject recently blistered*.

An instance is recorded of nine persons vaccinated in the year 1800 with virus of a purulent appearance, taken from a vesicle at a very late period of its course; extensive erysipelas resulted, followed by ulceration, and in some of the instances by a tendency to gangrene. Of a large number of persons vaccinated at the same time but with different lymph, none suffered (London Medical and Physical Journal, vol. 4, p. 488).

Mr. Wakley mentions the case of two infants, aged respectively two and six months, vaccinated with good lymph (originally), preserved in a bottle for thirty or forty hours, and which at that time had undergone decomposition. In both infants the arm became greatly inflamed; one of the children died with sloughing of the wound, and the other had abscesses form in the joints and elsewhere, but recovered. (Lancet, July 10, 1852.)

Dr. Tymann also mentions an instance where fifty persons were vaccinated with a fluid produced by dissolving otherwise good scabs in water, the *phial having been carried about in the pocket of the operator.* (American Medical Times, vol. 4, p. 107.) All these persons had very severe erysipelatous and gangrenous inflammation supervene, and three of them died. With respect to the danger of taking lymph from persons recently blistered with cantharides, Mr. Ceely states that he has known erythema and erysipelas propagated from *irritable*, late ruptured or exhausted vesicles, or from apparently healthy ones on a child who had a blister behind the ear. (Papers, etc., p. 125.)

Dr. Huder relates an instance of five children, all vaccinated from the same child, in whom very quickly the arms became swollen and oedematous, one child suffering from convulsions and two from abscesses, no vaccine vesicle being on any of them. The child from whom the lymph was taken had, the evening before, a blister applied behind the ear. Four of these children were vaccinated with clean lancets, and the fifth, being at a distance from the others, with points. (Medical Gazette, v. 13, p. 440.)

Husson relates also the case of two persons in whom sloughing ulcers resulted from the application of vaccine lymph to a surface blistered with cantharides.' (Dec. des Siences Méd., tome 56, p. 423.)

Doctors Seaton and Buchanan mention three public vaccinators who made use of a moist lymph, preserved in a bottle, *after it had been kept for a week;* and one vaccinator expressed his opinion that the lymph being ammonical and putrid, was no obstacle to its success, nor to the regular course of the vaccine disease that was produced by its insertion. (Sixth Report of the Medical Officers of the Privy Council, p. 102. On Vaccination, by Edward Ballard, M. D., pp. 84-89.)

Doctor Paul F. Eve does not admit the possibility of the inoculation of erysipelas by vaccination, as will be seen from the following extract from his article on the health of the Southern Army:

> "Erysipelas by Vaccination. In regard to the inoculation of erysipelas by vaccination, independant of a peculiar atmospheric influence, and irrespective of some adventitious circumstances connected with a wound, I am not prepared to admit. We are all familiar with the idiopathic variety of this affection attacking the cutaneous and mucous surfaces, at times, too, becoming epidemic, and apparently in affinity with puerperal peritonitis, and we know the traumatic type, but surely this disease does not originate from a specific virus. It is evidently infectious, but not, I believe, contagious. A distinguished surgical writer, admitting that it is inocuable, states expressly that it would be impossible for it ever to appear in a sound individual. There, then, must be a predisposition in the general system, it would seem in every instance, usually induced by malaria, before it is developed. And if this be true, namely, that the attack depends for its origin upon a peculiar state and condition of the patient's health, is it not then unwise, not to say erroneous, to suppose that erysipelas occurring after vaccination is due to a poison escorted by vaccine matter into the system? I do not, therefore, believe it inoculable by this little operation."

The view maintained by Hippocrates and his followers, that erysipelas was a disease originating from some intestine commotion of the humors, and that the offending matter was thrown off or eliminated by means of the skin, has been held by a large number of writers, with various modifications and slight additions up to the present time. The French especially advocate this view, and as a general rule deny the contagiousness of erysipelas. The English writers, on the other hand, are almost unanimous in considering the disease as capable of propagating itself by contagion under certain circumstances. Dr. Cullen admitted a species of erysipelas capable of throwing off contagious emanations. He says, "This disease is not commonly contagious, but as it may arise from an acrid matter externally applied, so it is possible that the disease may sometimes be communicated from one person to another."

The first well-authenticated facts militating against the old notions, and proving the contagious nature of erysipelas, were published by Dr. Wells in 1798; for although Sauvages, in his "Nosologia Methodica," published thirty years before, admits an *erysipelas contagiosum*, his views are obscure and his authority doubtful, as the epidemic of Toulouse in 1715, to which he refers in support of his opinion, appears to have been scarlatina, and not erysipelas. The examples brought together by Dr. Wells, in which this complaint appeared to be unequivocally propagated by contagion, have been sustained by similar cases, described by Pitcairn, Stevenson, Gibson, Lawrence, Gregory, Elliotson, Arnott, Watson, Rogers, Goodfellew, and other English physicians.

The question of the possibility of communicating the poison of erysipelas along with the virus of the vaccine disease, is intimately associated with that of the contagiousness of erysipelas.

FACTS ILLUSTRATING THE PROPAGATION ON ERYSIPELAS BY CONTAGION.

In the brief discussion it was freely admitted that erysipelas at times prevails as an epidemic, and appears to be produced by some general epidemic influence, and that in many cases the disease may be most plausibly accounted for by sudden changes of atmospheric temperature, along with considerable moisture, together with derangement of the bowels, and the effects of particular articles of food, ardent spirits and vicious habits; and that isolated cases frequently occur in private families, and even in hospitals, in which the disease, as is often the case with typhus fever, typhoid fever, hospital gangrene, pyæmia and Asiatic cholera, spreads no farther.

The rapid propagation of erysipelas, both in the sick room and in the wards of the hospital, has been so frequently observed that no doubt can exist of this disease being under certain circumstances communicated by emanations, by fomities, or by some palpable virus. The adoption of this proposition does not at all overthrow the belief which we also hold, that the origin and spread of erysipelas in hospitals, and in private families, will depend upon the hygenic condition of the wards and rooms, and upon the state of the constitution of the patients.

It is the intention of this brief note to detail facts, rather than to enter into any hypothetical discussion.

In the summer of 1760, a person laboring under *erysipelas of the face* was brought into St. Thomas Hospital, in London, where he died. Another patient, having a different disease, was put into the same bed before it was duly purified. This patient was shortly after seized with erysipelas of the face.

Several other persons in the hospital were then attacked, among whom was an upper nurse, or sister, and she died. A rumor hence arose that the plague had got into the hospital; and so widely did this opinion spread that an advertisement was inserted into the newspapers of the day, contradicting the rumor. Dr. Ballie described it as spreading also in St. George Hospital, London, and Dr. Cullen in the hospital at Edinburgh. Dr. Wells has brought together several examples in which the complaint appeared to be unequivocally propagated by contagion.

"I visited," says Dr. Wells, on the eight of August, 1796, in Vine street, Clerkenwell, an elderly man named Skelton, who had been attacked several days before with *erysipelas of the face.* In about a week afterwards he died. On the nineteenth of the following month, I saw Mrs. Dyke, of about seventy years of age, the landlady of the house in which Skelton had been a lodger, and found her laboring under an erysipelas of her face. I inquired whether any other person in her house had been ill of the same disease since the death of Skelton, and was told that his wife had been seized with it a few days after his decease, and had died with it in about a week. During my attendance upon Mrs. Dyke, an old woman, her nurse, was attacked with the same disorder, and was sent to the parish workhouse, where *she* died. Mrs. Dyke has since informed me that a young man, the nephew of Skelton, was taken with the disease of which his uncle died, shortly after visiting him, and survived the attack only a few days. That she herself had been several times with Skelton, and his wife during their sickness, and after death had removed some furniture from the room they occupied to her own apartment."—Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge.

Dr. Wells relates other histories of the same kind, which in like manner occurred when *there was* no epidemic of erysipelas prevailing.

Dr. Pitcairn attended, in February, 1797, a lady with child-bed fever, who had erysipelatous inflammation in her skin. Her new-born babe had erysipelas of the pudendum, and both mother and child died after a few days' illness. Eight days after the death of the child, the lady's mother and a servant maid, both of whom had attended the child in its illness, were attacked with *erysipelas facici*, from which both recovered.

Dr. Stevenson details briefly the results of twenty-one caess of erysipelas which occurred in his practice in 1821-2:

> "It spread, in many instances, through the members of the same family; in some it appeared soon after visiting friends, or relatives, during the period of the disease. A person who was attacked while in attendance on an erysipelatous patient, went home to her parents, who resided at some distance, as soon as she was taken ill; they were soon successively seized, and the mother died in a few days." (Transactions of the Medico Chirurgical Society of Edinburgh, v. 2.)

Dr. Gibson has recorded similar cases which came under his observation in 1822. (Transactions Medical Chirurgical Society of Edinburgh, v. 3.)

> "A young man with erysipelas of the face, was brought to his father's house at the distance of some miles. He ultimately recovered. His master had died a few days before of a febrile disease. The father of this young man was attacked with erysipelas in both hads and arms, which spread to the face. He died in a few days. The infant son of a gentleman was seized with erysipelas on one foot. The mother was afterwards with erysipelas of the scalp. The nurse, who suckled the child, was seized with symptoms of pneumonia, and was removed to her father's house, four miles off. Her father, who had some days before her arrival, received a wound of the scalp, was seized with erysipelas of the face and scalp, and died soon afterwards. A sister, living in the same cottage, had fever with sore throat, from which she slowly recovered. Two children in the same house were cut off with what appeared to be the croup. The disease in the sister and children was supposed to be erysipelatous inflammation of the fauces and trachea.
>
> A woman was admitted into the infirmary of Montrose, with suppuration of the hand, which had followed an attack of erysipelas. Some days after her admission, the patients in the two beds next to her were seized with erysipelas. It was afterwards found that, notwithstanding all the patients were removed from that ward, and the process of cleaning, whitewashing and fumigating adopted, the disease again reappeared when fresh patients were placed in this ward, so that it became at length necessary to shut up the infirmary for a time.—Cyclopædia of Practical Medicine, Art. Erysipelas.

Mr. Lawrence also mentions similar cases. (Medico Chirurgical Transactions of London, vol. 14.)

Dr. George Gregory in his valuable lectures on the Eruptive Fevers, has expressed his belief in the contagious nature of erysipelas in no unequivocal terms, and his views are worthy of careful consideration in this connection.

> "A connection of more than twenty years with the small-pox hospital, has given me abundant opportunities, not only of confirming the truth of these propositions, but of showing that we may carry our views much further. I feel persuaded, *first* that erysipelas may commence in an hospital without the suspicion of importation. 2. That being so generated, from bed to bed, it may spread by contagion. 3. That the miasm generating erysipelas is identical with that which in lying in hospitals generates puerperal peritonitis, which in foundling hospitals and workhouse nurseries gives rise to pudendal gangrene and umbilical ulceration—which in army hospitals generates hospital gangrene—which in hospitals differently circumstanced is found to occasion a malignant form of cynanche, both mucus and cellular, with otitis, glossitis, an asthenic form of laryngitis, the most aggravated type of typhus gravior.
>
> "The origin of scurvy in crowded and ill-regulated ships is obviously a branch of the same general doctrine. A destructive miasm is there generated which is far more injurious to the human frame than the use of salt provisions. Whatever be the exact nature (or essence) of the miasm which thus generates erysipelas, peritonitis, gangrenous ulceration or scorbutic blotches, it is something depressing to the vital power.
>
> "The dependence of erysipelas on a miasm *sui generis* is no new doctrine. It has been stated over and over again by individnal writers, but it has never, I think, been urged by systematic authors with the importance which it merits; nor has the doctrine been received as one of the avowed axioms of pathology. Dr. Rollo, in a treatise entitled, 'A Short Account of a Morbid Poison Acting on Sores,' and published very early in this century, distinctly announces the principle, and illustrates the intimate connection between erysipelas and hospital gangrene.
>
> The circumstances which lead to the development of ochletic miasm have never been investigated with all the accuracy which is desirable, and of which the subject is certainly susceptible. The first in importance is undoubtedly overcrowding the wards of an hospital. When the French academicians (I think it was early in the French Revolution) were laboring diligently to reform the abuses in the Hotel Dieu, some of them were at the pains to calculate in how many hours, supposing the ward to have been hermetically sealed, all the patients in it must necessarily have died, presuming that each adult requires for his support a gallon of air per minute. The time was wonderfully short.
>
> 2. But it is not numbers alone which are to be considered. A ward might safely hold fifty cases of simple fracture, which would not with safety contain twenty cases of compound fracture. Something, therefore, depends on the nature of the disorder. All disorders which throw out diseased secretions are more apt to taint and vitiate the air than those where no secreting process goes forward. It is on this account that the wards of the Small-pox Hospital are so peculiarly liable to generate ochletic miasm.
>
> 3. Another element of great importance in determining the sources of ochletic miasm is the degree of attention bestowed on cleanliness. If the bed linen, mattresses, palliasses, sheets, and blankets, be frequently changed, the floors well cleaned, and the walls frequently whitewashed; if the nurses be careful to carry away all foul secretions, and to purify the patient's body by an abundance of soap and water; in short, if the internal regulations of the hospital be good, miasm would, I suppose, be rarely engendered, even though the ward be crowded.
>
> 4. A fourth element must enter into the calculation, and that is a good supply of fresh air. This by some is considered all in all; but it is not so, and all the ventilation in the world, conducted on the most scientific principles, and superintended by Dr. Reid himself, would fail in preventing ochletic miasm, if feather beds or bolsters, soaked in unhealthy discharges, are permitted to remain in the ward.
>
> 5. Dr. Rollo has advanced a step further in the analysis of ochletic miasm, and maintains that the disposition to erysipelas and its correlative diseases (puerperal peritonitis, and hospital gangrene) depends partly on a peculiar, but hitherto undetected condition of the atmosphere. He is led to this opinion by observing that erysipelas sometimes shows itself in the airiest, least crowded, and best regulated hospitals. Without stopping to inquire how much is due this circumstance, we are fully warranted in saying that the

> state of the atmosphere must not be lost sight of in such an investigation. We known on the authority of Dr. Lind, that in Batavia and other localities notorious for malaria, hospital gangrene and erysipelas, and every sort of associated disorder, prevail with intensity at certain seasons.
>
> Assuming it as proved, that erysipelas is liable, from one or more of the five causes now detailed (viz: accumulation of persons, character of the discharges, want of cleanliness, want of ventilation. constitution of the atmosphere), to spread epidemically, it is still to be shown that this disease throws off contagious emanations, which can, *per se*, independent of any such influences, propagate the like complaint.
>
> "Dr. Wells has met this question fairly by detailing a variety of cases where erysipelas spread by contagion in *private houses*, and under circumsrances calculated to exclude all agency save that of simple contagion."

Dr. Gregory supports his views by a reference to the cases of Drs. Wells, Pitcairn and others, and also by his own individual experience.

Dr. Elliotson, in his "Principles and Practice of Medicine," gives the following account of the mode in which he contracted the disease in his own person:

> "I recollect once having had it, five days after stooping down over a patient, who had the disease in so violent a form that he died of it. I was looking into the state of his skin, and his breath came into my face. I turned away with a feeling of disgust, and said, 'I hope I have not caught it,' but, five days afterwards, having forgotten the circumstance, I was seized with erysipelas. I felt chilly, and my head was sore; and I had the disease violently."

Professor Arnott also has given striking examples of the propagation of erysipelas from one person to another, not only under the same roof, and in the same locality, but also when the parties lived at a distance from each other, and the intercourse had been but for short periods of time.

Dr. Thomas Watson, who advocated the view that erysipelas is contagious gives the following incident in his "Lectures on the Principles and Pracoice of Physic," which had been told him upon good authority:

> "A man living somewhere in Westminster fell ill of idopathic erysipelas. In that state for some reason or other, he was removed thence; and his brother, who was a servant in or near Portland Place, received him clandestinely into his master's house, and allowed him (for two nights I believe) to share his bed. That brother was soon attacked with erysipelas; and in the course of his illness was visited by his master. The master was also attacked; and it is worthy of remark, that in both master and servant, the disease showed itself just seven days after they had respectively come near another who was affected with it."

Dr. Rogers has related a case, which closely resembles that of Dr. Elliotson:

> "A medical student went into the country, and was requested by his brother, a medical man, to visit an erysipelas patient. While leaning over her he became conscious of a nauseous odor, which almost caused him to be sick. A few days after, he was suddenly seized with shivering, followed by fever; erysipelas shortly came on in the head and face, and he died after a week's illness."

In the following instance, communicated to Dr. Campbell De Morgan, Surgeon of the Middlesex Hospital, by Dr. Goodfellow, it is evident that the disease spread from bed to bed:

> "In the epidemic of typhus that prevailed in the autumn of 1838, more or less of erysipelas was constantly to be found in the wards; and, as a general rule, it spread from bed to bed. On one occasion, however, this was more than usually striking. It occurred in the large fever ward, containing thirteen beds, and well ventilated. Erysipelas attacked a patient on that side on which were seven beds. She was in the bed next but one to the end; the patient lying in the next bed, the third from the end, was next attacked, and then the patient at the end. The disease successively attacked all the patients in the order in which the beds were placed, until it reached the lower end of the ward. It then attacked the patient lying at the same end of the ward, but on the opposite side, and spread from bed to bed until it reached the last on this side, the patient lying in which was the only one who escaped."—A System of Surgery by Various Authors, Edited by Holmes, pp. 247-8.

Dr. Steele, in his Annual Report on Guy's Hospital for 1863, writes, that for some years past it has been customary to place patients suffering from erysipelatous wounds in these (the medical) wards, in order to diminish as much as possible the risk of extending infection in surgical wards, as well as to promote recovery in the patients themselves. It happened, however, that in one of the wards of the new hospital into which a patient suffering from erysipolas was placed, in the course of the past year *five* persons suffering from other complaints were attacked with the disease; and although none of the cases were attended with fatal consequences, the occurrence is sufficient to point out the danger which mush be occasionally apprehended."

Erysipelas has appeared extensively, and for long periods, in the Birmingham, Edinburg, Glasgow, and London hospitals and it has been frequently necessary to empty and whitewash the wards and thus rid them of the disease.

Many of the surgeons of the English navy believe in the contagiousness of erysipelas; and it has been debated, whether scrubbing the decks, or dry rubbing them is the best mode of cleasing a ship and preventing the spread ot the disease.

The old Dreadnought, hospital of the Thames is said to have been so impregnated with the contagious matter of erysipelas that she had ultimately to be taken up, and a new vessel substituted.

There was a diversity of opinion amongst the Confederate surgeons with regard to the contagiousness of erysipelas. This diversity of opinion was clearly referable in some cases to dogmas embraced during education, and to a want of careful and extended observation, and investigation of the origin, and mode of propagation, of the diseases incident to camp life. The reliability and value of the testimony of men upon such questions, clearly depends, not merely upon the extent of the field of observation, but also upon the mode in which, and the intelligence with which, the phenomena are investigated.

Many cases occurred during the progress of the war, in which erysipelas was clearly referable in its origin and spread to the crowding together of large numbers of sick and wounded, in ill ventilated hospitals.

The following communication from Dr. J. C. Nott, of Mobile, Alabama, illustrates, not only the dependence of erysipelas upon crowding, but also shows that in such cases, in like manner with hospital gangrene, the disease is best eradicated by scattering the patients and giving them free ventilation. It would be surely unwise and unphilosophic to refer the origin of erysipelas in such cases to an atmospherical influence, for the disease was most prevalent and most fatal in the most crowded hospitals, and was most speedily and effectually destroyed by breaking up those sources of contagion.

No light whatever is thrown upon the subject by declaring the disease *infectious* and not contagious in crowded hospitals. We can only refer the propagation of infectious diseases to the exhalations from the sick, or from the excretions of their bodies, which act upon the extended surface of the lungs and skin of those immersed in the infected atmosphere; and we know that in the case of the two most *contagious* and *infectious* diseases—small-pox and measles—the diseased actions may be propagated in both ways by the inhalation of the exhalations of the sick, as well as by direct contact with the morbific matters.

MOBILE, November 21, 1866.

Professor Joseph Jones, M. D.:

Dear Sir—Your letter came to hand yesterday, together with two numbers of your journal. I am sorry that I have no notes or statistics relating to hospital gangrene.

My connection with the army was in the command of General Bragg, commencing about six weeks before the battle of Shiloh. I had, it is true, been the Medical Director in Mobile for some time previously, but we had no wounds to deal with. Very soon after we got to Corinth all sorts of camp diseases prevailed among the troops—diarrhœa, typhoid fever, etc., and erysipelas. The colonel of a regiment came to me and begged me to visit a small brick church in the vicinity of Corinth, in which his men were dying at a fearful rate with erysipelas. On visiting the church, I found some seventy or eighty sick or wounded men crowded together in a small church, and about one-half of them with erysipelas. There had been daily skirmishing going on, and about one-fourth of the men had been wounded. The disease attacked those wounded, as well as others, indiscriminately. Many of them were dying with erysipelas of face and scalp, who had not been wounded, and I never saw a more revolting scene than this hospital presented. I ordered it to be evacuated at once, and the patients to be removed to tents, at some distance off in the open field. The effect was immediate and salutary. The erysipelas ceased to attack others, and the health of the command improved rapidly.

At the same time above alluded to, we had some cases of hospital gangrene among the wounded in different hospitals, up to the time of the battle of Shiloh. Being occupied very busily in office as Director of the Post, I had no time for visiting hospitals, and the battle of Shiloh coming off soon, and there being very little hospital accommodation, we were compelled to send off in every direction 10,000 wounded and as many sick. So I saw very little of what occurred among our wounded.

I afterwards went into Kentucky; was at the battle of Perryville, and other smaller battles; but here we had to leave our wounded behind, after every battle.

So really my experience has not been extensive or satisfactory in hospital gangrene. I have seen a good many scattering cases during the war, and have found them best treated by the application of nitric acid, iron, tonics, stimulants and good diet.

On the whole, then, my observations and information are too indefinite to be worth much, and I write more to state the simple fact that we did have cases of hospital gangrene before and after the battle of Shiloh, and I looked upon it as close akin to erysipelas. Very respectfully, yours, etc., J. C. NOTT.

It will be seen from the following statistical information and sanitary report of the Moore Hospital, Manassas Junction, Virginia, for the month of January, 1862, that in this hospital, which received the worst cases of typhoid fever and pneumonia, and was liable to sudden and unavoidable crowding of the sick, erysipelas attacked almost universally the patients operated on, only two escaping.

"MOORE HOSPITAL," MANASSAS JUNCTION, VA,, February 7, 1862.

Thos. Williams, Surgeon, C. S. A., Medical Director Army of Potomac:

Sir—I have the honor to forward the report of the "Sick and Wounded" of the Moore Hospital, for the month of January. The face of it shows only 235 patients admitted, while 77 of these have died—a fearful mortality, I confess—and did it extend to all diseases would soon decimate our army. But when it is recollected that the 235 men kept here were picked out of over 2900 that have passed through and were sent further back, and that those kept are the sickest—in fact a number came in moribund, others dying from six to twenty-four hours after their arrival—the mortality does not appear so appalling. At the beginning of January there were remaining 114 sick and convalescents; of these 25 died during the past month, making the mortality 102. The report shows 37 cases of febris typhoides, with 17 deaths, which is, strictly speaking, not true, as there have been but four or five cases of well-developed typhoid fever in the wards, and those so diagnosed are, in the majority of cases, simple continued fever, taking on a typhoid form, but wanting in all the particulars of typhoid fever proper; and, I feel confident, was there an opportunity afforded for post-mortem examinations, they would be found wanting in the pathological changes peculiar to the disease.

There were 128 cases of pneumonia treated, with a loss of 45, almost 36 per cent, though not large when the condition of the patients at the time of entering the hospital is taken into consideration; a large majority of the cases are sick from three to ten days in camp before they are brought to the hospital. Such cases presenting bad symptoms, but still not necessarily of a fatal character, after a ride in an ambulance or wagon of three or five miles over a rough road, are placed beyond redemption. Stimulants and carb. ammonia may revive the vital spark, and the man live for several days, and occasionally, I am happy to say, has elasticity enough about his constitution to get well. As an evidence of the fatality caused by surrounding disadvantages, I have simply to refer to some ten or twelve cases of pneumonia in my nurses where every case has recovered, each one of them showing the good effects of antimony in the early stage of the disease.

Those sent from this place to general hospital, have been convalescents sent further back to make room for the sick. They have been South Carolinians and Mississippians, and were sent to Charlottsville and Warrenton.

The number of furloughs (47) is large for the number of patients; but when it is considered that all of the wounded—at least 60—from the battle of Drainesville, were here, that will be accounted for.

I may add, that the two cases of erysipelas were purely idiopathic, and in the ward where all the worst wounded were, there was quite a number of other cases there, arising from any little operations performed, such as removing a bullet or spicula of bone, but two patients operated on escaping. On one of those I ligated the carotid artery; in the other, amputation of the thigh was performed. The latter operation was performed three weeks since, and the same day a bullet was extracted from the shoulder, which immediately took on erysipelatous inflammation, whilst there has never been the slighest symptoms of it about the amputation. In several of these cases, and especially the idiopathic, the inflammation was not confined to the skin, but extended to the subcutaneous areolar tissue, forming what Dr. Stone, of New Orleans, says is different from erysipelas, and what he calls "subcutaneous areolar inflammation," never running its course without suppuration, and occasionally to an enormous extent, invariably presenting typhoid (low) symptoms. I am, sir, your obedient servant,

J. F. BELL, P. A. C. S., Surgeon in Charge.

These examples might be multiplied, but these are believed to be sufficient to illustrate the experience of many Confederate surgeons upon the intimate relations of erysipelas, in its origin and spread to such diseases as hospital gangrene, which were known to be contagious.

On the other hand the armies were never so healthy, and the wounded were never so free from erysipelas as during the most active campaigns.

The army of Gen. T. J. Jackson (Stonewall) during its active campaign in the Valley of Virginia was remarkably healthy, and the wounded, as I ascertained by a personal inspection and examination of the records of several of the largest hospitals connected with the department commanded by this distinguished soldier, were exempt to a great degree from both erysipelas and hospital gangrene. This immunity was due to several causes, but chiefly to the active habits and good morale of his soldiers, to the comparatively abundant supplies of this rich country, and to the large and commodious hospitals established at Staunton and other eligible points in this elevated and healthy region. The truth of this assertion will be sustained in the following sanitary report of his Medical Director, Surgeon Hunter McGuire:

> NEW MARKET, Virginia, April 15, 1862.
>
> S. P. Moore, Surgeon General, C. S. A.:
>
> *Sir*—I have the honor to forward the consolidated report of sick and wounded, and the return of the medical officers serving in the Army of the Valley of Virginia for the month' of March, 1862, (Major General Jackson's Command).
>
> Though subjected to long and sometimes forced marches, the health of this army was better during the month of March than during any other since its organization. It is a fact well known to regimental surgeons and commanders, that the numbers reported sick during marches, even when they are long and fatiguing, provided the weather is clear and dry, is less than that which occurs when troops are stationary and subjected to the ordinary duties of camp.
>
> Towards the end of the month recruits and drafted men were added to the regiments, and the amount of sickness increased; indeed, the large proportion of those reported sick belong to the men recently attached to the regiments, who are not yet inured to the hardships of a soldier's life. I enclose also a list of the killed and wounded of this army, in the engagement near Winchester, March 23, 1863. It numbers sixty-one killed and three hundred and sixty-one wounded. Some of the latter were mortally wounded, and have since died, which increases the number of dead, as far as known, to eighty-eight, and proportionately reduces the number of wounded. One hundred and fifty-seven of the wounded were removed from the field, the rest fell into the hands of the enemy. It is gratifying to know that our dead were decently buried by the citizens of Winchester, and that our wounded have received every attention from the physicians and ladies of that place. Very respectfully, your obedient servant,
>
> HUNTER McGUIRE, Medical Director Army Valley of Virginia.

While we do not at all deny, that erysipelas at times prevails as an epi demic, and appears to be produced by some general epidemic influence, and that in many cases the disease may be most plausibly accounted for, by sudden changes of atmospheric temperature, along with considerable moisture, together with derangement of the bowels, and the effects of particular articles of food; at the same time there are facts to show that this disease is at times, if not always, contagious.

Neither would we be understood as insinuating, that instances of its transmission by contagion, are common in private practice, for isolated cases frequently occur in private families in which no member of the family and no nurse contracts the disease.

The origin and spread of erysipelas in hospitals, will depend upon the hygienic condition of the wards, and upon the state of the constitution of the patients.

Many of the Confederate surgeons appeared to be aware of the dangers attending the indiscriminate use of sponges, dressings, and uncleansed wash bowls, when erysipelas was present in their wards. When wounds were cleansed with sponges or rags which had been used on erysipelatous, patients, it was frequently observed that the disease appeared; and such propagation appeared to be clearly referable to the transference of the contagious matter.

It can be shown therefore that the evidence of contagion in erysipelas rests upon nearly the same grounds as in the well known contagious diseases, scarlet fever, measles, and typhus fever.

Many of the British physicians and surgeons entertain but little doubt of the connection, if not the identity of erysipelas with puerperal fever. Without entering into an extended examination of the facts upon which this view rests, it will be sufficient to recall the well known fact, that inoculation with the fluid of a female who had died of puerperal fever, is a most fatal source of diffuse cellular inflammation to the dissector.

Dr. George Gregory, in his Lectures on the Eruptive Fevers, says that he had heard of a case where vaccine matter taken from the arm of a child laboring under erysipelas, had communicated both diseases.

And finally, Dr. Willan has testified that if a person be inoculated with the fluid contained in the phlyctinae or vesicles of a genuine erysipelas, a red, painful, diffused swelling and inflammation analogous to erysipelas is produced.

This experiment has not, as far as we are aware, been repeated; and, with such a direct demonstration of the possibility of communicating erysipelas by inoculation, we are at a loss to know upon what principles of reasoning, authors, who have never performed a single experiment themselves, assume the right of setting aside the assertion of Dr. Willan.

By these facts, therefore, as well as by those which occurred during the recent war amongst the soldiers and citizens of the Confederate States, we are justified in drawing the conclusion that it is possible to communicate the poison of erysipelas through the medium of the vaccine matter

The practical conclusion which we draw from this discussion, is that:

As far as possible soldiers, especially during long and fatiguing campaigns, and when crowded in hospitals and barracks, should be vaccinated with the lymph or vaccine virus from young healthy children. It is best, both in civil and in military practice, not to use the vaccine virus from the arms of soldiers, because their mode of life is an artificial one, to a great extent; a stereotyped life of restraint and hardship, and of great sameness of diet, and consequently a life liable to great excesses and irregularities of habits, and to great and sudden variations of health, as well as to slow and imperceptible deterioration of nutritive fluids.

The quality of the vaccine virus will depend, in great measure, upon the manner in which the nutrition of the body is performed. We use the word nutrition in its largest sense. Vaccine matter obtained from the arms of the feeble and often scorbutic convalescents of crowded civil and military hospitals, is wholly unfit for the propagation of the vaccine disease. Of all places, *civil and military hospitals* are the *very last*, to which the profession should look for supplies of vaccine matter; and yet, during the recent war, it was in the crowded hospitals that vaccination was most dilligently, perpetually and indiscriminately performed. In these most destructive centres of contagious diseases of typhoid-fever, erysipelas, hospital gangrene, and pyaemia, the so-called vaccine matter passed from soldier to soldier in an endless round. Is there any marvel that under *such a system, enforced by military law*, the matter should have progressively deteriorated, and the accidents of vaccination (spurious vaccination) have become both common and serious?

SECTION VII.—FRESH AND DRIED VACCINE LYMPH AND SCABS FROM PATIENTS SUFFERING WITH SECONDARY OR CONSTITUTIONAL SYPHILIS AT THE TIME AND DURING THE PROGRESS OF VACCINATION AND THE VACCINE DISEASE — PROFESSOR EVE, DOCTORS KRATZ, FUQUA, RAMSEY, CRAWFORD, PERCIVAL, STOUT, WOODWARD, HUBBARD, BOLTON AND OTHERS ON THE RELATIONS OF SYPHILIS TO SPURIOUS VACCINATION—DISCUSSION OF THE RELATIONS OF SECONDARY OR CONSTITUTIONAL SYPHILIS TO VACCINATION—THE POSSIBILITY OF COMMUNICATING TUBERCULOSIS AND CANCER BY INOCULATION—THE POSSIBILITY OF COMMUNICATING SECONDARY OR CONSTITUTIONAL SYPHILIS BY INOCULATION—TESTIMONY OF TORELLO, 1498; WILLIAM CLOWES, 1637; GIDEON HARVEY, 1665; DANIEL TURNER, 1717; JOHN HUNTER, 1776; AND OF DOCTORS DUNCAN, WATSON, HAMERTON, EGAN, PRICE, RIZZI, WALLER AND OTHERS, ON THE CONTAGIOUSNESS OF SECONDARY SYPHILIS.

THE POSSIBILITY OF COMMUNICATING CONSTITUTIONAL SYPHILIS THROUGH THE MEDIUM OF VACCINE VIRUS—TESTIMONY OF M. VIENNOIS, DRS. PACCHIOTTI, MARONE, POGUE, DEPAUL AND OTHERS—SMALL-POX EPIDEMIC IN MOBILE DURING WINTER OF 1865-6—SYPHILITIC VACCINE AND THE MEANS OF PREVENTING IT—INOCULABILITY OF TUBERCLE—MORTALITY OCCASIONED IN NEW ORLEANS AND THE MISSISSIPPI VALLEY—POSSIBILITY OF TRANSMITTING SCROFULA BY VACCINATION—INOCULABILITY OF CANCER—CONTAGIOUS NATURE OF CONSTITUTIONAL SYPHILIS—COMMUNICATION OF SYPHILIS BY VACCINATION—MODIFIED OR LACTO-VARIOLOUS INOCULATION—VARIOLATION OF THE COW—ANIMAL VACCINATION.

We examined at different times, during the progress of the recent war, and also had under treatment, various skin affections, which presented the characters of the cutaneous diseases, characteristic of secondary syphilis, which were directly traceable to impure vaccine virus. I saw several cases in which enlarged buboes in the axilla and groin accompanied the peculiar skin affection induced by impure vaccine matter. No such results followed vaccination as performed by myself or immediately under my direction during the war; these accidents were avoided in my civil and military practice, by adhering rigidly to the rule of using lymph from the arms of healthy children and infants; the opportunity therefore did not present itself of observing and carefully noting the disease in its first stages. The cases resembling constitutional syphilis and which were said to have resulted directly from vaccination, which came under my observation and treatment, were as a general rule of long standing, and had been collected from different hospitals, and from various regiments, serving in widely separated districts.

In the summer of 1863, I examined a large number, and if my memory is correct, over two hundred cases of severe skin affections and general constitutional derangement resulting from vaccination, in the large hospitals in and around Richmond, Virginia. In these cases, as well as in those examined in other parts of Virginia, South Carolina, and Georgia, great difficulty was experienced in tracing the impure matter to a definite source, that is to the point at which it became contaminated or deteriorated. I do not wish to be understood as asserting or insinuating that this large number of cases presented the symptoms of secondary syphilis; so far from this it appeared to me that those cases which presented the most complete resemblance with constitutional syphilis were not as numerous as those which were clearly referable to scorbutic and other deranged conditions of the system induced by fatigue; exposure and bad diet.

During the progress of the war, the subject of the relation of vaccination to constitutional syphilis, engaged my most anxious thought and I had determined to make it a special subject of investigation in the field and general hospitals, immediately upon the completion of my investigations upon typhoid fever, malarial fever, small-pox, hospital gangrene, and pyæmia, believing that a correct solution of this difficult and important question was to be obtained only by a personal examination of the cases as they arose in the regiments serving in the field, and a careful collection and examination of the testimony of the regimental surgeons and assistant surgeons. From experience gained in other investigations in the field and general hospitals, I was well aware that such labors required much time and were beset with many difficulties. From the terrible drain upon the Confederate States for men, the hospitals and convalescent camps were subjected to the most rigid scrutiny, and all men not absolutely disabled from every kind of duty, were at the earliest possible moment transferred to clerical and light duty in the quartermaster, commissary, medical and purveying departments.

From the great disparity of numbers, and from the immense extent of country in which the operations were conducted, the Confederate troops were in perpetual motion. The same soldiers, in the course of a few months, conducted fatiguing campaigns which extended over entire States, and fought bloody and desperate battles with superior forces in localities separated by hundreds of miles. Whole armies that had been victorious at some remote portion of the border, or of the Atlantic and Gulf coasts, were suddenly transported by railroad, across the entire Confederacy, to take their immediate part, without rest, in the bloody battles of the mountains of Tennessee and in the valleys of Virginia. These difficulties were experienced to a greater or less degree by every medical officer who undertook the investigation of this subject; and it has been rendered still more obscure by the sudden manner in which the struggle terminated, and by the loss of the most extensive and valuable reports on file in the Surgeon General's office at Richmond.

I have sought to remedy, in a small degree, these defects, by addressing inquiries to a large number of those who formerly occupied positions in the medical service favorable for the investigation of the causes of the accidents following vaccination. It must be confessed that, up to the present time, the replies received to these inquiries have been wanting in that full and accurate detail of individual cases, which is so necessary to the proper solution of the question, whether the lymph or scab of a vaccine vesicle its peculiar virus, contain another infections principle, as that of syphilis.

The affirmative of this question was held by many, both in civil and *military practice*; and a number of the Confederate surgeons boldly took the ground that secondary syphilis could be communicated along with the vaccine virus, and especially when the dried scabs were employed. In the records upon this subject, which we examined in the Surgeon General's office in the Confederate Capital, this view was clearly announced. Several of these reports had been prepared in accordance with a direct order issued by the Surgeon General, directing a careful investigation into the origin and causes of spurious vaccination. The history and results of a portion of the investigations ordered by Dr. Moore are given in the following extracts from an official letter:

Professor Joseph Jones, M. D.:

During the month of March, 1863, Medical Director Guild was so impressed with the importance of this affection that he ordered a committee of investigation into the extent of its prevalence, its causes and nature. The committee limited their inspection to those regiments only whose medical officers had reported the presence of this "spurious vaccination." The committee consisted of Surgeons R. G. Breckinridge, now of Houston, Texas; Herndon, of Fredericksburg, Virginia, and ———, of North Carolina. The cases of spurious vaccination was most numerous in the Twelfth and Sixteenth Georgia Regiments. In one of those regiments we found over one hundred cases of ulcerated arms and hands, and in many instances extending to the body and lower extremities. In one of these regiments the historical connection with syphilis was most conclusive. They had all been vaccinated from the arm of a comrade of very dissolute habits, who had just returned from a leave of absence. This soldier was at this time in camp, and presented unmistakable evidences of syphilis. I do not think I err when I state that there was no chancre on the penis, but we rested our opinion of the existence of syphilis upon the characteristic sore throat and eruption, and his confessions as to the recent existence of chancre. He had just returned from some little village in Georgia, and informed us that a physician practicing there had taken matter from his arm and inserted it into the arms of a large number of young persons in his neighborhood. The "vaccination" in all these cases was done by the soldiers themselves, and not by their medical officers; consequently, acting upon the popular idea that the larger the sore the more complete is the protection, they selected the worst sores for the propagation of the virus. The committee agreed, with regard to the worst of these ulcers, that their appearance and progress were so analogous to syphilides that they did not hesitate to class them as such. The usual treatment for syphilis did not *cure or benefit these cases with any marked uniformity.* We find a ready explanation of this observation in the condition of constitution and circumstances under which the treatment was instituted—poor diet, scurvy, and camp life. * * *

The testimony of Dr. J. F. Gilmore is decided as to the syphilitic origin of a portion at least of the cases of *spurious* vaccination in the Confederate Army of Northern Virginia, as will be seen from the following communication, kindly placed in my hands by the late Professor Paul F. Eve, M. D.:

[Copy,] MOBILE, ALA., May 27, 1867.

Prof. Paul F. Eve, Nashville, Tenn.:

Dear Doctor—I promised Dr. Nott, before he left us for Baltimore, to write Professor Jones, relative to spurious vaccination, of which I saw a great deal in the army in Virginia, and as I am in your debt a letter, I trust you will pardon me for doing so through yourself.

The small-pox broke out in the army in Virginia, shortly after the battle of Sharpsburg, whilst we were in camp, in the valley, in the vicinity of Winchester, reorganizing and watching the movements of McLellan. The first case occurred in the brigade of Gen. G. T. Anderson, of Georgia.

At that time, I was the Chief Surgeon of McLaw's Division. The disease did not show itself in my command until the latter days of October. The first case occurred in a private of the Thirteenth Mississippi Regiment, who contracted it while hauling supplies from Staunton for the army. It, however, did not make much headway until after the battle of Fredericksburg, the thirteenth and fourteenth of December, I believe.

The act of Congress reorganizing the army after the expiration of the twelve months' volunteers, provided that each man who re-enlisted, should receive, in addition to the bounty, a furlough for thirty days, and Gen. Lee, in order to carry out the provisions of this act, without materially weakening the army, issued a general order granting furloughs to two (2) men to every hundred on duty. This order, I think, was issued whilst we were in the valley. Shortly after the battle of Fredericksburg, a private in Semmes' Georgia Brigade returned to his command, who had received a furlough under the order. He came back to his regiment, with what he supposed was an ample supply of virus for all of his friends, a large number of whom he vaccinated, not only in his own brigade, but also in Cobb's. In this way the impure virus obtained a stronghold in these two brigades.

McLaw's Division was composed of four brigades: Kershaw's, South Carolina; Barksdale's, Mississippi; Semmes' and Cobb's, Georgia brigades. I don't recollect that I saw a single case in either Kershaw's or Barksdale's commands, but in the other two commands we had about three hundred cases.

By the direction of Surgeon and Medical Director L. Guild, I had two hospitals established, one for Semmes' and the other Cobb's brigades; Semmes' under the charge of Surgeon Todd, and Cobb's under the charge of Surgeon Eldridge. For some cause which I don't recollect, Dr. Guild thought it better that these cases should not be sent to general hospital; and it being impossible to obtain suitable buildings, tents were used.

The cases presented the appearances that are familiar to those of us who were connected with the Confederate army—large rupia-looking sores, sometimes only one, generally several on the arm in which the virus was inserted. In a number of cases, these sores extended, or rather appeared, on the forearm; and in two cases that I saw, they appeared on the lower extremities. These men suffered severely from nocturnal rheumatism. Several cases had, to all appearances, syphilitic roseola.

I saw enough of the trouble to convince me thoroughly that the virus owed its impurity to a syphilitic contamination.

The cases all improved under the administration of the iodide of potassium and vegetable diet. In some of the cases, Grau's combination of the iodide of potassium and corrosive sublimate was employed.

In many of them there was a marked scorbutic tendency, which may in part account for the bad effects of the virus; but there were in the great majority of the cases unmistakable evidences of syphilis.

When the hospitals were broken up, just a few days before the battle of Chancellorsville, there remained under treatment about twenty cases, that were sent to general hospital at Richmond.

To Surgeon Todd, we are indebted for the following facts, that were embodied in a report made by myself to Surgeon Robert J. Breckinridge, Medical Inspector of the army.

To the man above alluded to, who returned to his command shortly after the battle of Fredericksburg, was traced the origin of the vaccine virus that had wrought so much mischief in the two Georgia brigades. He stated that on his way back to the army, that he was detained in Augusta, Ga., and whilst there visited a house of ill-fame, and was vaccinated by one of the female inmates. This man denied ever having had syphilis previous to his vaccination. The rupia looking sore on his arm, and roseolous eruption of the skin of a coppery hue, added to the fact that others vaccinated from the sore presented many of the characteristic features of constitutional syphilis, are to my mind unmistakable evidences that syphilis may be communicated, I will not say by vaccine lymph, but certainly by vaccination; possibly by getting a small quantity of blood on the point of the lancet in performing the operation.

I am unable to say whether the woman by whom this man was vaccinated had syphilis or not.

In thinking of this subject, the thought suggests itself to my mind, that if the blood can convey a poison, that the vaccine lymph would be equally as capable; for if there is anything in our theories about cells, and especially if the cells have an individual existance, certainly it is fair to presume, that any cell that has its existance from a person suffering from a constitutional disease, might have imparted to it the disease of the parent. In no other way can we account for the transmission of disease from father to child; and then again the query arises, if the blood can be poisoned by a disease of the cells, why may not, the other fluids be also? But this is theorizing and we are after facts, and I think that my experience will sustain me, in the assertion, that syphilis may be communicated by vaccination. I am not prepared to say that its transmissibility is not due to a small quantity of blood that happens to get on the point of the instrument, when the operation is performed, by inserting the virus directly from the arm of another, or by a small quantity that happens to get on the crust when removed; but I am forced to conclude that I can see no reason why vaccine lymph cannot as well be the vehicle of contasion as blood itself.

The testimony of a distinguished member of our profession is strong in proof, that syphilis may be communicated by the blood, who affirms that he had constitutional syphilis from a poisoned wound got from operating after the battle of Shiloh. * * *

Yours, truly, J. T. GILMORE,

Dr. James Bolton, in the report from which we have already introduced valuable facts relative to the history and origin of "spurious vaccination," in the *Confederate army*, held that besides these cases which were referable to the imperfect nature of the vaccine matter and to the unhealthy condition of the system, and to the development of latent diseases, others occurred of a far more formidable character.

Dr. James Bolton testified:

So great was the dread of the small-pox in the army, that the men became impatient of the slow process of vaccination by medical officers with carefully selected virus. Common soldiers and even officers became zealous operators. The more powerful the local action the more effectual was the protection supposed to be, and "large sores were in great request." In a short time the most terrible consequences ensued. Large numbers of men were unfit for duty. The attention of medical officers was called to a wide spread truly contagious disease. On careful inspection the ulcers presented the various appearance of genuine chancre. In some instances there was the elevated, cartilaginous, well cut edge surrounding the indolent, greenish ulcer; in others there was a burrowing ulcer, with ragged edge; in others there was the terrible destructive sloughing process devastating the integuments of the arm. Many of these cases were so situated that their history could be preserved, and in these secondary symptoms appeared, followed in due time by tertiary symptoms, The chancre was followed successively by axillary bubo, sore throat, and various forms of eruption, (syphilo dermata), while the system fell into a state of cachexia. Finally, previous vaccination did not protect against this disease. In short, the disease was genuine syphilis.

Whence its origin? So far as was ascertained by strict inquiry it had in no case been propagated by a medical officer. In these instances there was no case of true vaccinia followed by syphilis. When first seen it was true syphilis, and it never presented any other phenomena than those of this foul disease. This was true of all cases; the phenomena were those of true syphilis from its inoculation to its development, on to its termination. There was, therefore, no evidence of the contamination of vaccine virus by that of syphilis.

The results of treatment also corresponded with this view of the disease. The mercurial treatment was the only one which could be relied upon. On account of the scorbutic condition of many of the patients it was necessary to use mercury with great caution, and the alterative use of the bi-chloride of mercury was best adapted to the generality of these cases.

The question remains. Whence the origin of this disease in the army? It prevailed most extensively among the troops from the State of Georgia, and it was thought to have been traced to a soldier from that State, who had returned home on furlough, and who was said to have vaccinated himself from his wife. It was also reported that there were many cases of this form of disease in the neighborhood of his home.

Another source of this disease was said to have been traced to the person of a highly respectable lady residing in the neighborhood of Danville, Virginia.

Finally, a third source was thought to have been traced to Culpeper county, Virginia.

All these accounts of the disease, however, are exceedingly indefinite and unreliable. In fact, they may have been given by some of the men in order to conceal the really impure origin of the disease.

The following propositions may then be fairly deduced as a résumé of the foregoing facts and remarks:

1. That in some instances pure vaccine virus being introduced into a scorbutic system, or one deranged by some other cause, e. g., epidemic influence, an aberration of the phenomena of vaccinia was produced, but the patient was protected from variolous contagion.
2. It is highly probable that concrete pus, or some other morbid animal product was used, and that it produced local, eliminative inflammation, with some degree of constitutional disturbance. In these instances there was of course no consequent protection.
3. In very many cases there was true syphilitic inoculation. In these cases the virus was unmixed with that of vaccinia. Its source was purely syphilitic. Here again there was no protection.

From these propositions there result the following corollaries:

1. Vaccinations should only be performed by educated physicians, except in case of necessity, and then by carefully instructed persons, under their observation. Vaccinations of themselves and of each other, by soldiers should be strictly prohibitted.
2. Vaccine virus should be carefully selected from healthy persons in whom the disease was known to have run a normal course.
3. Except in case of necessity, vaccination should not be performed when the system of the subject is in an unhealthy condition.
4. Except in case of absolute necessity, vaccination ought not to be performed when there is an epidemic influence prevailing which predisposes to erysipelas or other congeneric diseases.

APPENDIX TO DR. BOLTON'S PAPER ON SPURIOUS VACCINATION AS IT APPEARED IN THE LATE CONFEDERATE ARMY.

In a paper on spurious vaccination, as it occurred in the late Confederate Armies, I stated that my original paper, and the original sources of information, having been destroyed, I was compelled to write from memory, and was unable to verify my remarks by quotations. Since then I have discovered some fragments of the rough draft of my original paper, containing several abstracts of army reports. I therefore respectfully present these by way of appendix to the paper recently read before the Academy, only regretting that these abstracts are so meager.

Surgeon Habersham, in charge of the second division of Chimborazo Hospital, presented an elaborate report upon a large number of cases of spurious vaccinia which came under his care. He states that in obedience to an order from the Surgeon-General, he vaccinated all the soldiers as they were admitted. Instead of the usual phenomena of vaccinia, a spurious form of disease appeared, which he thus describes:

"A few days after the insertion of the virus, and in many cases within twenty-four hours, the seat of the puncture became very much inflamed, with a deep red inflammatory blush around it, which gradually implicated, in the severe cases, nearly the whole of the affected limb." A pustule rapidly formed instead of a vesicle, which soon discharged an ichorous fluid. This fluid was, in the course of forty-eight hours, converted into a dark mahogany-colored, irregularly-shaped phagadenic ulcer, with everted edges, presenting the appearance of a syphilitic ulcer. There was also more or less pyrexia and loss of appetite. In these highly aggravated cases, successive crops of pustules appeared upon the upper and lower limbs, but never upon the head and trunk.

He observed three grades of the disease differing in degrees of malignancy. Thinking these results may have been due to the impurity of the virus, he cast it aside, and obtained some of a highly respectable civil practitioner, accompanied with the assurance that it had been "used in several cases with a perfect result. The introduction of this virus into the arms of some ten patients, resulted in development of the disease in question in three of them, while in the remainder it produced apparently a true pustule. From this fact, and the immunity which healthy-looking men enjoyed, I was led to believe that the predisposing cause existed in a vitiated and impoverished condition of the blood. There was no evidence to show that its origin was syphilitic."

Surgeon H. regarded the disease as a consequence of "an impoverished condition of blood, being deficient in fatty matter." Accordingly he treated his cases by supplying a rich nutritious food, by the judicious use of alteratives, and by the administration of cod-liver oil. He states that a large supply of this oil was received in the early part of August, and that by the nineteenth of the same month many were well enough to rejoin their commands. The oil was used internally and locally. He arrives at the following conclusions:

1. That the disease is pustular and resembles ecthyma.
2. That it is a local manifestation of a general disorder or vitiated condition of the blood.
3. That this vitiated condition resulted from impure and spare diet, together with inattention to cleanliness.
4. That syphilitic virus had no influence in producing the disease.
5. That the effects were not produced by any impurity in the vaccine virus.
6. That the disease can be removed by those means only which are calculated to improve the general condition and restore the healthy play of all the functions.

W. S. Mitchell. Chief Surgeon of Rodes' Division, thus reports a spurious vaccinia which appeared in January, 1863. Inflammation occurred within twenty-four hours after inoculation. In two or three days a vesicle was formed which was soon followed by pustulation. Some observers state that the eruption was pustular from the very beginning. The ulcers were covered with thick scabs having a tendency to renewal. The ulcers were dry and many had indurated edges with little disposition to granulate and presented a tawney grey color resembling the Hunterian chancre. The hundred and twenty-seven cases which occurred in the Forty-Fourth Georgia Regiment, were derived from one man who was inoculated from his wife, in Georgia. Many similar cases were reported as having, occurred in that State. Some cases yielded to, and some resisted treatment. Some were treated with mercury, and some with iodide of potash, with little advantage.

The best treatment consisted in keeping the ulcers clean and applying nitrate of silver. Many cured in this way showed a tendency to return. The disease could not have been due to canstitutional vice, as the subjects were all previously healthy. It was evident that the constitution was subsequently involved, as all recovered during the Maryland and Pennsylvania campaigns. Two hundred and forty cases left Fredericksburg, all of which recovered on the march. It was evidently not followed by constitutional symptoms. Many similar reports were made by surgeons of other divisions.

Surgeon Read, in charge of the Officers' Hospital, Richmond, Virginia, states that a number of cases came under his care which resisted treatment while at hospital, but that all recovered on being sent to their homes.

The reports of Surgeons Habersham and Read evidently refer to a class of cases not of syphilitic character. Some of Surgeon Mitchell's cases, which were not fully traced out by him, may have proved syphilitic when fully developed. All those which continued to be under his observation seem not to have been syphilitic. Even this, however, is not perfectly clear. The history of the disease is certainly very suspicious. The patients were previously healthy, and the local results resembled strongly those of syphilitic inoculation. The constitution was evidently involved, but neither secondary nor tertiary *symptoms* were devloped so long as they were under his observation, and the patients recovered without the use of what is commonly understood by anti-syphilitic treatment. These facts, however, will not be regarded by every one as conclusive, for it will not be denied that syphilis may be cured without mercury We are not informed how long these cases continued under Surgeon Mitchell's observation, and secondary symptoms may have subsequently appeared in some of them. Without his knowledge, Surgeon Breckinridge investigated the disease as it came under his observation, and carefully examined the reports of surgeons transmitted to him in compliance with orders. He concludes "that the disease was essentially syphiloid, and in respect as a whole resembled in its incipiency, progress or termination, the genuine vaccine disease. The army was generally in good health. There was some tendency to scurvy, but no connection could be traced between the disease and this condition.

In many cases there were no evidences of a scorbutic condition. The subjects were generally in robust and vigorous health. There was no case in which I had reason to believe that any antecedent constitutional vice, either inherited or acquired, exercised the slightest influence in developing or modifying the disease. Previous vaccination failed to afford any protection against it"

Surgeon A. H. Powell's report:

A driver vaccinated a soldier from his own arm on the eighth day from the date of his own vaccination. Two or three days after there appeared at the place of the insertion of the virus a suppurating ulcer, followed by large unhealthy ulcers on the arm which did not heal for six months. These ulcers were accompanied by an enlarged gland in the axilla. The soldier had two ulcers, a large one at the point of vaccination and another on the back of the hand. Several others were inoculated with the same virus and with like results. Nothing was known of its origin.

Abstract of the report of Surgeon J. A. Etheridge:

Three hundred and thirty-two occurred in Dale's Brigade, beginning as early as January. Inflammation commenced twenty-four hours after inoculation. A vesicle appeared in two or three days, but in some instances the eruption was pustular from the first. These were followed by ulcers covered with thick scabs. The ulcer closely resembled the Hunterian chancre. Two hundred and twenty-seven cases occurred in the Forty-fourth Georgia Regiment. and the virus in all these cases was derived from one man. He stated that he was vaccinated from his wife's arm while at home on furlough, and that there were other cases in the same neighborhood. All the cases in the Twelfth Georgia Regiment were inoculated with virus derived from the Forty-fourth Georgia Regiment. All cases in the Twenty-first Georgia Regiment, with few exceptions, were derived from the same source. The cases in the Fourth Georgia Regiment were derived from a scab obtained from the chief surgeon of the division.

Treatment.—Some were cured by the topical application of nitrate of silver, some stimulating lotions and others by ointments. Some were treated by the internal use of mercury and iodide of potash, but with little benefit. The best remedies seemed to be nitrate of silver locally applied, and cleanliness. In many cases there was a tendency to return.

Cause.—The disease could not have been due to an impoverished condition of the blood, as it occurred in some who had just returned from furlough, and were in high health. Although the disease was not caused by constitutional vice, yet some vice must have existed at the time, protracting the disease and interfering with the cure, since all recovered during the Pennsylvania and Maryland campaign. Two hundred and forty cases existed when the army left Fredericksburg, and all recovered on the march. Although he, at first, suspected it to be syphilitic, he was afterwards satisfied that it was not. No secondary symptoms occurred, and all recovered on the march. At the same time there must have been some constitutional vice, from the disease breaking out after being apparently cured.

Abstract of Report of Surgeon Hicks:

Perfectly pure virus was mixed with some whose history was unknown. This mixture produced vesicles which soon became pustular; in no other instances it produced pustules from the beginning. The suppuration was so profuse that no scab was formed for two or three weeks. After several successive scabs, the ulcer healed, leaving a purple cicatrix. These sores were frequently accompanied by others upon the extremities only. There were no constitutional symptoms. In a few cases there was debility.

Treatment.—Some were treated with mercury, some with iodide of potash internally and nitrate of silver locally; some were treated with cold water locally and generally. The cold water treatment succeeded best. Anti-syphilitic treatment failed entirely. The worst cases were sent to General Hospital, and the others went with the army. All of the latter recovered speedily. With a few exceptions, all sent to the hospital recovered, but required two or three months' longer treatment. In one case a sore above the ankle healed under the local application of bruised stramonium leaves.

Cause.—It was not scorbutic, because scurvy cannot be inoculated. The officers and men, whether they had been at home or had remained in camp, whether they used scorbutic or anti-scorbutic diet, were equally obnoxious to it. Scorbutic diet will prolong it. It does not protect the system against small-pox. It may be reproduced any number of times on the same individual, no matter how far advanced the sore may be. A hospital nurse, insusceptible of vaccinia, was readily inoculated with this virus. It was not syphilitic, because it did not present the appearance of syphilis and did not yield to anti-syphilitic treatment, which served rather to prolong the disease. No secondary symptoms were observed. It resembles rupia, but this cannot be inoculated.

Abstract of Surgeon Haighill's report:

A soldier was vaccinated on the fifth of April. His arm was healed by the first of May, when a large ulcer appeared on one of his ankles. On the seventh of May, he complained of sore throat, and appeared to have secondary syphilis.

Treatment.—Iodide of potash internally and lunar caustic locally. A general improvement took place under this treatment, but the ulcers had not healed on the ninth of September, more than four months after the first appearance of the disease.

Abstract of Surgeon Rutherford's report:

In nineteen out of twenty cases the virus (lymph ?) was taken from the arm of a comrade by some soldier or officer, and not by a surgeon, without reference to the period after vaccination. Matter was often taken from beneath a scab. Of course this was true pus and not lymph. The only case following the use of a scab resulting in malignant ulcer occurred in Jeffrey's Battery. The scab appeared to be derived from a secondary vaccination. From a limited experience, he concluded that the disease was due to the introduction of pus into the system.

Professor Paul F. Eve, M. D., of the Medical Department of the University of Nashville, as will be seen in the following quotation from his article "On the Health of the Southern Army," believes that syphilis may be transmitted by vaccination.

"*Syphilis in Connection with Vaccination.*—From all I have heard and read on the transmissibility of syphilis by vaccination, the question, from the evidence already accumulated, would appear decided in the affirmative. While I have *seen* nothing confirming this opinion, yet I do know that cases did occur in Richmond, Va., said to be corroborative of it, and that medical officers in the Southern service were specially cautioned as to the sourse whence vaccine matter was derived. Since my return to Nashville, I find that in some instances syphilitic diseases have been definitely traced to the insertion of vaccine matter. My colleague, Dr. Briggs, called my attention recently to a case of this kind, the source of which he entertains no doubt. I failed to see it, as the patient had left for the Hot Springs of Arkansas. When told that he had secondary symptoms of syphilis, he replied that it was impossible, as he had never contracted the primary, though confessing that he was almost daily exposed to it. Two other physicians were consulted as to the affection, and from this history of the case were inclined to the belief of the patient, but stated it looked like venereal. It was subsequently ascertained that this person had been vaccinated from a girl of the town who labored under constitutional syphilis. Not only was the arm very sore, but buboes formed in the axilla, followed by ulcerations in the throat, copper blotches in the skin, nodes, etc.

"The possibility of communicating syphilis by vaccination, was agitated in Italy as far back as 1846; and the transmissibility of this unfortunate contamination was there definitely admitted in 1861, by a committee elected at a Medical Congress at Acqui in Piedmont, at which it was believed that numerous cases had occurred in both children and adults, who had been vaccinated. The names of Pacchiotti, Parola, Ponza, Tassani, of Milan, who I met there in charge of a large hospital after the battle of Magenta and Solferino, in 1859, De Kalt, Hubner, etc., vouch for the accuracy of this report. The transmission of (syphilitic) disease has also been maintained by Lecoq, Rollet of Lyons, and particularly by Vennois in the Archives Générales de Paris, 1860; and on this point, the admission of Dr. D. F. Condie, long known to occupy the front rank in the profession, and who has done so much for its literature, deserves serious consideration; and he publishes these words in a recent number of the American Journal of Medical Sciences:

"'Let it be strongly impressed upon the mind of every physician, lest in his attempt to guard the system against one formidable malady, he inoculate with another, more insidious in its operations, but not less destructive.'

"As to the consentaneous presence of two constitutional diseases in the same patient, and the contagiousness of secondary symptoms of syphilis, it is sufficient for us to state that at a recent meeting of the Academy of Medicine in Paris, the report from a committee, on which MM. Velpeau and Ricord served, (than whom it may be safely asserted two better names for this very purpose never existed in the annals of the profession), decided both these questions in the affirmative."

Dr. O. Kratz, in the following report to the Surgeon General on vaccination, originally published in the July number of the Confederate States Medical and Surgical Journal (vol. 1, 1864, p. 104), supported the view that secondary syphilis could be communicated through the medium of vaccine virus.

ON VACCINATION AND VARIOLOUS DISEASES. BY O. KRATZ, SURGEON, P. A. C. S.

The following remarks on vaccination and variolous diseases have been suggested to me from my own experience. Spurious vaccine and its deleterious influence on vaccination, seem to me worthy of further investigation as a subject hitherto not sufficiently appreciated.

In order to define my stand-point, let me state, at the outset, that Liebig's Theory of Fermentation is, till now, the best to explain the phenomena of vaccination, and that all the anomalies occurring may be best elucidated by this hypothesis. At the same time I do not feel warranted in subscribing blindly to it; but I think we have not any better as yet, and I simply adopt it in the same manner as I would have to conform to the atomic theory in treating about chemistry.

In vaccinating a subject, we introduce, then, the yeast—the virus—into the circulation, to produce the fermentation and its result, the scab. If there is a certain substance in the system for the virus to react upon, the scab will be formed, and the subject is vaccinated. If, on the contrary, this substance is entirely deficient or modified in some way or other, no scab, or an imperfect one, will be the result.

With very few exceptions the good vaccine matter will produce a normal scab on the subject never vaccinated before. The reacting matter in the system is eliminated, and by this process the liability to the infection of small-pox rendered impossible or greatly diminished. Possibly, in a long interval of time, this matter may be reorganized in the body, but never to its original state. I say never, because such a subject may be attacked by varioloides, but never by variola.

If this reacting matter is reorganized as nearly as possible to its original state, the second vaccination will produce a scab also, but never a perfect one. It may be perfect for the protection of the individual on whom it appears, but it offers no guarantee for revaccination on other subjects. I call this a pseudo-scab. This scab may yet retain much of the original fermenting property, but not the same as the genuine. If this virus is used again for revaccination of an individual, its product will offer again less guarantees of being protective. Continuing in this manner the scab will finally contain nothing but common suppurative matter—pus—as if taken from any other suppurating place in the body. The germ of the scab itself will be more or less modified and deviating from its normal structure.

As I have no book of reference on the subject, I quote the following from memory:

Some years ago, the Academy of Science in Paris investigated very closely the fact, if syphilis could be transferred by vaccination. The result obtained by repeated and most direct experiments was, that it could not be communicated by transmission of genuine vaccine virus, from one individual to another, affected with syphilis in any of its stages. Liebig's explanatory theory of fermentation holds good here. The vaccine virus will react only on certain substances in the system and ignore others entirely. We know, at the same time, that matter from a syphilitic suppurating surface will reproduce syphilitic symptoms on another subject.

I have had occasion to observe several well defined cases of Rupia Syphilitica produced solely by vaccination. Other respectable surgeons, worthy of implicit belief, from their scientific attainment, have noticed the same and similar facts repeatedly.

These subjects had never syphilis before, otherwise the inference would have been doubtful or worthless altogether. Therefore, instead of having had vaccine virus inserted, they have been inoculated with syphilis.

I have seen one case, where the product of the vaccination was serpetigo rodebs, a frightful disease of, I believe, cancerous character. Some cases had herpes excedens as the result of vaccination on their arm.

The syphilitic cases had been treated for other cutaneous diseases without any material amelioration. The mercurial treatment removed the symptoms at once.

I have never seen anomalous results from vaccination, if the following precaution was strictly adhered to: The vaccine matter used was taken from a healthy infant, never vaccinated before.

The indiscriminate vaccination and re-vaccination from arm to arm has been, in my opinion, the principal cause of the deterioration of the vaccine virus, and of producing cutaneous diseases from vaccination. A second cause may be found in the fact that the virus used is old and too rarely regenerated by passing it through the cow. Cow virus will fail only 1 in 100; good common virus will fail 3 in 100, if I remember right.—*Confederate States Medical and Surgical Journal*, July, 1864.

The testimony of Dr. Wm. F. Fuqua, of Virginia, formerly surgeon of the Seventh Florida Regiment, C. S. A., is clear and decided. Fifty-two Confederate soldiers, who had been inoculated with virus from the arm of a sailor who was laboring under syphilis, presented the characteristic symptoms of constitutional syphilis, as abscesses in the axillary glands, pain in the limbs and joints, sensation of dryness and ulceration in the throats, buboes, coppery colored spots, and loss of hair, and they were only relieved by syphilitic treatment. If these results of vaccination had been due to a depressed and scorbutic state of the blood, the syphilitic mercurial treatment would have greatly aggravated the diseased condition.

ON THE COMMUNICABILITY OF SYPHILIS BY VACCINATION.

BY WM. M. FUQUA., M. D., APPOMATOX COUNTY, VA.

On assuming charge of the Seventh Florida Regiment, late C. S. A., as medical officer, I found fifty-two men, who had been recently vaccinated, suffering from severe ulcers on their arms at the site of vaccination. Some of these ulcers had scabbed, and to all appearances seemed to promise a speedy "return to duty." There were others varying in size from that of a quarter of a dollar to that of a Mexican dollar. Their edges were hard, shining and everted; in some few cases they were undermined. An ashy-colored slough covered their base, which was from time to time cast off. This, however, was not always a genuine slough, but a tenacious gray and partially organized exudation. These ulcers were offensive, and discharged pus freely. The redness circumscribing them was limited, the limb but little swollen, and the pain of a burning, stinging character. In many instances the lymphatic vessels were much inflamed, and the axillary glands in each case were more or less affected. Many of these patients complained of pain in their limbs; there was some febrile excitement, and their appetites had been much impaired. Having thus briefly described these ulcers, it may not be improper to remark upon the hygienic condition of the regiment.

At this time, it was doing duty at Knoxville, in the department of East Tennessee, and was quartered a mile from town, upon soil which had been previously occupied by troops, who had left the encampment in no praiseworthy condition. To the south, southwest and west, passed the Holston river. The general health of the command was bad—the sick list comprising one-seventh of the command. The prevailing diseases were the malarial fevers and acute diarrhœa.

The first part of the treatment of these cases, consisted in their removal to a more cleanly and healthful locality; cleanliness of person and clothing was enjoined also, General directions were given as regards diet, and of maintaining their bowels in proper condition. The second part of the treatment was the local application of astringents in the milder cases, and eschoratics, varying from the mildest kind to that of the most potential, in conjunction with the astringent lotions in the severe ones. Under this regimen, some few improved; none, however, recovered; by far the greater number grew worse. Abcesses now began to form in the axillary glands; pain in the limbs and joints increased in severity; there was a sensation of dryness in the throats of many, which was speedily followed by ulceration. Our apprehensions were now fully awakened; each day we inquired more and more diligently for some new symptom which might be diagnostic. Coppery-colored spots now appeared upon two; the hair began to fall off in a third, and it was not a week before a syphilitic bubo, in its incipient stage, appeared in another. Heretofore, these cases had been denominated "spurious vaccination." Spurious they were in one sense; but specific in another, in the strictest acceptation of the term.

It is hardly requisite for me to state, that these cases were placed upon a syphilitic treatment, and we had the satisfaction, in a comparatively short time, of seeing a great number of them returned to duty. A few were sent to the General Hospital, one of whom died.

In conclusion, let me remark, that having mentioned to Dr. Frank Ramsey, then Medical Director of the Department, the nature of these cases, he requested me to make a report in detail concerning them, which was done, and in all probability found its way to the late Surgeon General's office.

Upon inquiry, it was definitely ascertained that the virus for inoculating these patients was obtained from a sailor, on the coast of Florida, who labored under primary syphilis at the time of vaccination.—Richmond Journal of Medicine and Surgery, June, 1866.

The following article by Dr. Frank A. Ramsey, of Memphis, Tenn., contains an argument for the possibility of the transmission of syphilis by vaccination, although its author does not feel justified in supporting this opinion in "a strictly professional disquisition." In a letter from Dr. Ramsey to myself, accompanying this paper, dated Memphis, November 15, 1866, he says: "The subject has occasioned me much thought, and incidentally some research, being on the watch for anything, however remote, at all applicable to the question. But I cannot say that I have formed any definite views regarding the question involved."

ABNORMALITIES OF VACCINATION. BY FRANK A. RAMSEY, M. D., MEDICAL DIRECTOR OF THE (Quondam) C. S. A.

It is, after conference, regarded as proper for the following letter to be published. The subject-matter of which it treats, was one of exceeding importance and interest, almost from the incipiency of the intestine strife, in the Southern States, but has not yet had, in the professional periodicals, any exhibition of the attention it elicited, or any declarations of results of observation or of investigation.

I do not deem it necessary to defend now the course of thought taken in the letter, written under the peculiar circumstances connected with the period at which it bears date. It has, however, a reference to a particular opinion, which I would not, at any time, or under any circumstances, support in a strictly professional disquisition; that opinion had been hastily expressed in the midst of official business, and for the purpose of producing a particular effect, which I honestly judged to be proper and best in the exigency.

Effects, very nearly resembling rupia, followed vaccination, with presumptively pure virus, in so many instances, as induced the Surgeon General to appoint medical officers connected with the Southern army to the duty of tracing, if any, the connection between syphilis and vaccinia; and the prosecution of this duty gave occasion to the letter, now presented in the hope that it will lead others to record their observations, experiences and reflections on the same subject; and with the intention on the part of the writer himself, under other and more favorable conditions, to give the subject further consideration:

MEDICAL DIRECTOR'S OFFICE,
ABINGDON, VIRGINIA, March 20, 1864.

Doctor:—Your note, of March the eleventh, informing me, that you had been appointed "chairman of a committee on the relation of vaccination to syphilis," and making references to my "report of last year," and asking me for "any further information relative to spurious vaccination," has been received; and I take the first opportunity, offered in the performance of official duties, to reply.

I have no facts, which have occurred within the field of my observation, directly relating to the sunject, as stated by you; but, with your permission, will continue writing, until I have given you something of the operation of my mind, occasioned by your note. I thank you for the honor you have done me, in preferring the request, and in the reference you have made to, I presume, a letter written by me, to a surgeon at Chattanooga, a copy of which I deemed proper to forward to the Surgeon General. That letter was written, as I now write to you, *currente calamo*, and though I preserved a copy, it was left at Knoxville, and has doubtless fallen into the possession of the enemy. I am, therefore, prevented from making reference to it, as I am debarred from any ability to consult authority, or to refresh my memory, as I should, and would do, if differently situated. But, if I correctly remember, the latter was not of such a character as to convey an idea, that the observations were of cases of spurious vaccination. Indeed, the basis of the letter was furnished by observations of results, or effects following the introduction, or inoculation of vaccine virus undoubtedly pure. And though the result or exhibits were in their course, certainly not such as ordinarily present from vaccination, or as are usually recognized as essentially cow-pox; yet observations were not sufficiently numerous, or continued for a time long enough, to determine whether any, or the same degree of immunity from small-pox was occasioned in subjects thus affected, as in those who presented the ordinary course of the cow-pox disease.

There were, however, practitioners of medicine who were esteemed, in communities in which they labored, as capable observers, who affirmed that these subjects were as free from liability to small-pox as those in whose economies the vaccine disease had exhibited nothing unusual in deviation from its regular course. If, then, the scab was undoubtedly a pure vaccine scab, and the effect was perfect, or relatively perfect, immunity from small-pox, notwithstanding there was nothing observed from the application of the virus, until the production of the ultimate effect, at all like vaccine disease in progress, the disease, I think, cannot properly be termed spurious. To be spurious, the vaccine virus must not be in the scab, or the effect must be an absence of any protective energy having been impressed on the economy into which the scab had been introduced. Varioloid consists of exhibits in course, differing from variola in course; yet no one, I presume, would feel himself justified in terming it spurious small-pox, because it is known to proceed from small-pox virus, will communicate small-pox, and leaves the economy it has effected impressed with immunity from a future attack of small-pox. Varioloid is, then, not spurious small-pox, but small-pox modified in its exhibits in progress through an economy previously impressed by the operation of the virus of cow-pox. Here the modifying cause is known.

So by analogy, the cases which gave occasion to my letter of last year were, each, an instance of modified cow-pox. The matter was obtained from Nashville, Tennessee, from Atlanta, Georgia, and from Richmond, Virginia, from surgeons of reliability, and the same results were observed to follow upon the introduction of the several matters, in some instances regular vaccinia, in others abnormal exhibitions; indeed, in many an approximation to the regular exhibition of the original poison from cow matter could not be discovered. And professional men, who were not destitute of reputation for capacity, affirmed, on the strength of observations sufficient to satisfy them, that the economies thus effected were impressed with immunity from small-pox as though they had passed through cow-pox in its regular exhibitions.

True, to make complete the analogy I have instituted, it remains to establish by experiment, that true vaccine in its regular exhibitions, in one instance, or more, can be produced by the inoculation of matter from one of these economies. Which experiment, however, I will leave to some one with more curiosity and temerity than I have, feeling satisfied myself, that they were modified cow-pox. But in these instances, the modifying cause is unknown. It must, however, have obtained an union with cow-pox matter, in its passage through an economy peculiarly affected, and, therefore, resided in the scab, not altered from its ordinary physical appearance, because, as yet, not sufficiently imbued with the acquired and modifying contagion. Or, it must have been a peculiar condition of the individual economies, into which the vaccine virus was introduced. Or, it must have been telluric or celestial relationships sustained by the particular persons affected; or, as Sydenham's comprehensive term is applicable in giving expression to such relationships—"the epidemic constitution."

In my previous letter, I believe, I advanced this last as sufficient to account for the abnormalities which have been observed. It is the more easily assumed, and probably the more easily sustained position. I will, however, not undertake to defend it here, for, notwithstanding my great respect to the "epidemic constitution," when I am at the bedside of a patient, I can, when I am reflecting, readily comprehend, that either one or all the positions may be defended, as the source of cause in its influence modifying cow-pox.

Will vaccine virus become possessed of capacity acquired in its passage through an economy peculiarly diseased, to propagate such disease in other economies? The question thus stated, will in some degree, embrace the relation of vaccination to syphilis.

Whether there is truth in the doctrine which has been promulgated, that two distinct contagious diseases cannot exist at the same time, in the same economy, it is not amiss to make reference to it here; for if it is not true, the fact does not justify the assumption that two poisonous causes cannot be introduced into an economy at the same moment, one having the office of vehicle for the other—does not justify an assumption that two poisonous causes in the same economy, at the same time, can occasion no modification, each of the other, or the one of the other—and if it is true, the fact or modification is at once established. More directly assertive of the virus acquiring a modifying capacity, even to the complete destruction of original physical appearances, and exhibitions of effects, is the idea suggested during the year 1800, by Richard Dunning, Surgeon, Plymouth Dock, that "the vaccine disease, united with some other virus, may have afforded the more active affection of variola." Dunning's reviewer, from whom I received my information, says "the hint deserves some attention, as a point of speculation, which cannot be subjected to the test of experiment."

I only make reference to it as an assertion made long ago, that one virus may be modified by another; for I do not regard the poisons of variola and vaccinia as being at all identical. This, I think, is evident, if there is truth in the following statement: Small-pox and varioloid will produce small-pox, but never cow-pox. Cow-pox will produce cow-pox, but never small-pox or varioloid. Cow-pox will prevent the occurrence of small-pox, or mitigate its severity, and lessen its mortality in the human economy. Small-pox having occurred in the human economy, is not preventive of cow-pox, if its poison be introduced by inoculation. Cow-pox, reproduced in the human system, inserted into the teat of the cow, will produce cow-pox. Small-pox, similarly introduced into brute animals, will not produce small-pox. This last assertion is made by Wm. Woodville, M. D., London, 1800, and by others, perhaps before, and several times repeated since; and within the past two years medical officers in the service have attempted, at Greenville, Tenn., to occasion small-pox in a cow, in one instance, and in a calf in another instance, using matter taken from a case of confluent small pox then under treatment, and inserting it under the cuticle, and introducing it into the stomachs, mixed with food, and without any bad effects whatever, or any disturbance of the health of the animals. I am aware that observations have been published, seemingly different from this, but there is a want of explicitness in connection with their relation which justifies a doubt of authenticity. But this, if you please, by way of parenthesis.

The most insidious of contagious poisons affecting the human economy is, probably, the syphilitic It has, doubtless, occurred to almost every practitioner to observe cases in which the subjects were known to have been treated for syphilis, and afterwards to have exhibited for many, very many years, entire health, when occasion, known or unknown, presented, and they offered themselves for treatment, affected with disease which the physician pronounced to be syphilitic, and which could not be cured, except by the administration of anti-syphilitic agents. The poison had remained latent or dormant for these many years, only awaiting circumstances or conditions favorable to the exercise of its capacity to effect. I had under my charge, for twenty years, a family, the children of which were generally healthy, whose father was treated for syphilis from the age of nineteen to twenty-four, since which he has enjoyed good health, seemingly, in every particular. His children, however, were frequently attacked with illness deemed sufficient to require my professional attention. No odds how simple the attack, even though when I first called, the evidences were nothing more than those of slight catarrh, I have never known them yield or mitigate until one dose, or more, of a mercurial—generally calomel—had been administered. This I have ascribed to the presence in their economies of the syphilitic poison derived from their father, and exerting an influence retarding healthy developments, or preventing the disappearance of symptoms of diseased action not in themselves syphilitic. The cases cited in "Montgomery on Pregnancy" bear well on this point. A woman married a man with latent constitutional syphilis. She became infected, which was first exhibited at conception, or in miscarriage, followed by secondary symptoms of syphilis. A woman contracted syphilis, was treated and recovered. A considerable time afterward she married. One, two, or three children were born, all affected with syphilis. The husband died, and the woman married again, a healthy man; and to this husband children were born, and all died, except one, affected with syphilis; the exception had mercury and recovered. One of the children communicated syphilis to the woman by whom it was nursed.

But the insidiousness of this contagion is more strongly exhibited in another case, cited by Montgomery. A woman, whose husband had constitutional syphilis, gave birth to a child; which died with syphilis in two months, the mother remaining wholly free from any exhibits of the affection. This husband died, and she married again, a healthy man. Four years after the former birth, she was delivered of a child, which, in a few months, presented the same syphilitic appearance manifested by the child of the first husband.

If these instances are, as observers affirm them to be, true, how little effort does it require for the mind to conceive the probability of a vaccine scab, having acquired the capacity from an economy, affected with syphilis, to propagate that disease? If a woman can remain in health, after sexual congress with a man affected with latent constitutional syphilis, and yet, years afterward, give birth to syphilitic children, begotten by a healthy man, it is within the bounds of legitimate assumption, to affirm that syphilitic exhibits may be manifested in an economy, by the introduction of vaccine matter, taken from an economy tainted with syphilis, even though it is in that system in latency, and had never been developed.

Two of the cases which gave occasion to my letter of last year, were ladies whose husbands occupied prominent and responsible positions in society. Neither the husbands or wives were at all under suspicion of immoral taint. The wives were vaccinated, and for many months were affected with ulcerations, which under other circumstances, would have been, without hesitation, pronounced to be syphilitic rupia. They came under the care of Acting Assistant Surgeon Meadows, then, as now, in charge of small-pox hospitals in this department. He put them on the use of bi-chloride of mercury, and they both recovered in ten or fifteen days.

Permit me to summarize. Two contagions may be introduced into the human economy at the same moment of time, and connected with the same vehicle; or, one contagion may be the vehicle of another, and each may exert its own ultimate effects, the intermediate effects being the exhibitions of but one or the other of the contagions having made impression; or the intermediate effects may be the exhibitions of one poison, which, having passed their course, the intermediate effects exhibiting the presence of the other poison, supervene and pass their course. Syphilis and vaccine. Two contagions may respectively modify each other. An illustration does not occur to me. One contagion may modify another, and while it is itself not subjected to a modifying influence, exerted by the one it has modified, it may be modified by another contagion. Cow-pox and small-pox, cow-pox and syphilis. The introduction of one contagion into an economy may arouse another which has remained dormant, or latent, and unsuspected. Cow-pox and syphilis.

An item relative to the treatment of small-pox: Acting Assistant Surgeon Meadows, in two cases of small-pox occurring in children, employed croton oil, applying it on the third and fourth day of the active fever to the breast, producing full and confluent pustulation. The immediate effect was certainly unpleasant—very considerable cerebral disturbance, evidently, in its intensity, ascribable to the croton oil pustulation; but he is convinced that the course of the disease was shortened two-thirds, desquamation beginning on the seventh day instead of during the second week, and that the eruption was one-half less than it would have been under other circumstances. He has also practiced opening each pimple just as it assumed the vesicular character, with the effect, he believes, of expediting the process, desquamation occurring one-third the time sooner than usual.

I have written, Doctor, hurriedly, but I hope that I have not been so rapid as to have failed wholly of interesting you, at least for the moment.

Very respectfully, your obedient servant, FRANK A. RAMSEY,
Surgeon and Medical Director, P. A. C. S.

To James Bolton, M. D., Chairman Committee on the Relation of Vaccina to Syphilis, Richmond, Va. (The Medical and Surgical Monthly, May, 1866, p. 140-147.)

Dr. Crawford, of Greenville, Tenn., was able to trace the impure virus which produced indurated ulcers and constitutional symptoms, to a single individual, and the disease thus disseminated by inoculation, yielded to the remedies best adapted to the treatment of syphilis:

GREENVILLE, TENN., January 27, 1867.

Professor Joseph Jones, M. D.:

Dear Sir—Having seen in the January Number of the *Nashville Journal of Medicine and Surgery*, a circular letter addressed by you to the surgeons of the late Confederate Army, instituting inquiries upon "Spurious Vaccination," I desire to respond to your inquiries, and to communicate those facts in my possession which may throw light upon this subject, which is fraught with so much interest to humanity and science.

During the winter of 1862 and 1863, I was "Surgeon in Charge" of the "Madison Hospital" (Confederate) at this place, during which time over 1000 patients came under my charge. Small-pox made its appearance in the hospital fifteenth November, 1862. In anticipation of the appearance of the disease, I had some time previous procured a fresh supply of genuine vaccine virus by vaccinating some healthy children. In this way I had kept a fresh supply on hand since 1856—that is, by vaccinating some healthy child every few months. I immediately ordered all patients then in hospital (350) to be vaccinated—both those that had been, as well as those that had not previously been vaccinated. The matter took well upon all who had not been vaccinated, and imperfectly in some cases that had been vaccinated. A "pest-house" was established, and the infected, as soon as the nature of the disease was manifested, removed at once to it. The disease did not extend to the patients in hospital; but from time to time patients were admitted, many of whom proved to be suffering with variola. But in no single instance was the disease communicated to those that had been recently vaccinated or re-vaccinated, and but six cases of varioloid occurred out of the 350 patients, all of whom had been exposed to the contagion of small-pox.

There was great alarm, both among citizens and soldiers; for the small-pox cases were exceedingly fatal, owing to the want of proper comforts and attention. Out of ninety cases, forty proved fatal. Neither the citizen nor soldier was satisfied of his immunity from danger, unless he could make a "*sore*" of some sort upon his arm. Consequently vaccination was perseveringly sought from the ugliest and foulest looking ulcers. The idea being with the masses, that vaccination loses its effects after a few years, and must be renewed; if a sore was not produced by matter from one arm, another was sought. This state of things continued without any mischievous effects until about the first of January, 1863, when Col. Clayton, then Commander of the Post at this place, who had been on leave of absence some weeks in North Carolina, returned with an ugly looking ulcer upon his right arm which was reported to be genuine matter. The cry of *eureka* was raised, and it was not long until dozens, both citizens and soldiers had this matter inserted into their arms. From this dates the history of "Spurious Vaccination." Col. Clayton had been successfully vaccinated some years before; but so soon as it was known that we were in the midst of the most loathsome of all diseases, I re-vaccinated him twice with genuine virus, but without effect. What the history of the case was from which he received the infectious matter, I never learned, for the Colonel could not find out. Col. Clayton was about twenty-one years of age, sanguine temperament, and in excellent health at the time he received the infectious matter into his arm. The ulcers I regarded at the time, and still regard, as caused by inoculation with *syphilitic virus*. The cases ran an indefinite course of from three weeks to six months, and yielded only to *Blue Mass*, *Iodide Potassium*, internally, and *Sul. Cupri.* externally. Some cases taken in their incipiency, yielded in a few days to the external treatment alone.

It is proper to state that there was no tendency to scorbutic disease among either soldiers or citizens, and the infectious matter was equally as severe among the citizens as soldiers. The hospital was well provided with everything calculated to promote comfort and health. The patients were in good houses, had plenty of clothing, and rations in abundance, such as fresh meats, fruits, potatoes, cabbage, etc. There was no scarcity of these things in this country at that time, and what the Government did not provide the citizens supplied with a liberal hand.

This "spurious vaccination" yielded no protection whatever from variola. I have seen more than a dozen cases of variola occur where there were large ulcers from this spurious virus, the patients thinking they were protected from the disease by such *sores*. The spurious matter would take effect in all cases and all sorts of constitutions.

About this time orders were issued from Surgeon General Moore to procure fresh vaccine virus through the cow. I tried the experiment three times without succeeding. First on a cow seven years old, with a calf six months old. Then a young heifer two years old, and finally the calf. I inserted the matter in the teats, nose, ears and various parts of the skin, but never succeeded in getting a crust. Finally I fed the calf on the dried scabs mixed with its food, but it died without yielding me the much sought for treasure.

In August, 1863, the Confederate Army evacuated East Tennessee, and in September, 1863, the Federal Army took possession and held for a time. That army, under Gen. Burnside, was composed of new recruits, made up mostly of six months volunteers, many of whom had not been in the service three months. This same disease was among them. This army was abundantly supplied with anti-scorbutics, and fed with a liberal hand, and had never been exposed to hardships.

My best wishes for your success in your undertaking.

Yours sincerely, S. P. CRAWFORD.

If such accidents had been confined entirely to the Confederate Army, or to the period of the war, when the citizens were to a greater or less extent subjected to unusual privations, and to the action of the most depressing causes, the views of those who denied emphatically the possibility of transmitting the poison of constitutional syphilis by the process of vaccination, would receive at least a show of support from the apparent dependence of the abnormal phenomena accompanying the vaccine disease, upon the depressed and deranged states of the system, induced by improper nutrition and physical causes.

It happened, however, that a large number of cases, which were referred by both citizens and physicians to the contamination of the vaccine virus with the syphilitic poison, occurred in the quiet manufacturing community of Graniteville, after the close of the war.

Under the kind, liberal and efficient management of the intelligent head of the Graniteville Manufacturing Company, the operatives enjoyed comfortable dwellings and abundant supplies of nutritious and wholesome food. This class of the population of South Carolina were, perhaps, more favorably situated as to subsistence and support, than the great majority of the citizens of South Carolina, whose dwellings and barns had been laid in ashes, and whose social and agricultural system, the growth of centuries, had been so completely overturned as to convert, without warning, the richest into the poorest.

The following report of Dr. W. F. Percival, of Aiken, South Carolina, is important, as being the most clear and intelligent statement which I was able to obtain, after considerable inquiry:

REPORT ON THE COMMUNICATION OF SYPHILIS THROUGH THE MEDIUM OF VACCINE VIRUS AMONGST THE INHABITANTS OF GRANITEVILLE AND VICINITY, 1866. BY W. F. PERCIVAL, M. D., OF AIKEN, S. C.

AIKEN, November 15, 1866.

Professor Joseph Jones, M. D.:

Dear Sir—I received your letter yesterday, and inclose a copy of my report on spurious vaccination with pleasure. I intended sending it to one of the medical journals, but have never had time to revise and prepare it for publication; the *facts*, however, are all stated.

I am, with high esteem, yours very respectfully, W. F. PERCIVAL.

Spurious Vaccination.—The Epidemical Society of London prepared four questions on the subject of vaccination, to be addressed to the most eminent medical men in Europe. The third was as follows:

Have you any reason to believe, or suspect, that lymph from a true Jennerian vesicle has ever been a vehicle for syphilitic or other constitutional infection? Among the number who responded (over 400), but three asserted their belief, twenty-seven in doubt and nine had no experience. The rest asserted that it could not be done.

In a report from the College of Faculty of Medicine, at Prague, the following language is used: "The possibility of inoculation with syphilis by means of vaccination, (although not a single completely attested fact is known in this country,) is not to be excluded, for the conveyance of syphilis, by means of inoculation, has been placed beyond a doubt."

In the face of so much testimony against the possibillity of such an occurrence, the following report will perhaps throw some light on the subject.

About the last of April, 1866, I was requested to take charge of some cases of spurious vaccination, at the manufacturing village of Graniteville. One hundred and fifty cases were presented for examination, men, women, and children, of all ages, from fifty years to twelve months. The larger proportion were operatives in the factory, the others engaged in out-door work. There was every variety of constitution, from the pale attenuated girl, to the hardy and robust laborer. Of the one hundred and fifty cases, ninety-three had been previously vaccinated. The appearance of the sore was identical in every case, viz; an excavated ulcer, of circular form, with raised and hardened edges and base. They varied in size, from one half to two inches in diameter, covered with grey or dark sloughy matter, and secreting unhealthy pus. There was no appearance of granulation. In some cases ulcers of a similar character, appeared on the arms affected; others on the opposite arm, and in a few on the lower limbs. In some, abscesses formed on the inside of the arm, and in nearly all the axillary glands were inflamed, and many suppurated. A thick and unhealthy crust would form, to be soon separated by the pus which accumulated beneath. In one case, there was a copper-colored eruption on the body and limbs; in two or three the hair dropped off. None of these cases were in the primary stage. The disease had existed from three to eight weeks. Most of them pursued their ordinary avocations, as far as possible, and complained of no constitutional symptoms, or any loss of appetite.

The history of these cases, as given to me by the individuals first vaccinated, was, that they had obtained the virus from a man whom they afterward discovered to have had primary syphilis. One was vaccinated from another, and so it spread. None of the ulcers had evidenced any tendency to heal. One of the worst cases was a man who, two years previously, had small-pox.

The usual treatment, both constitutional and local, for venereal ulcers, effected a cure in from three to six weeks.

It might be supposed that the predisposing cause of the ulcers existed in a vitiated condition of the blood, dependent on local causes, but I had twelve or fifteen cases in other localities, some of them ten miles distant. All of these had obtained the virus with which they were vaccinated at Graniteville. All of these were strong and healthy individuals. Again, most of the cases reported had been vaccinated a short time previously, and had progressed in the usual manner without any trouble, showing that no local cause had produced any derangement of their system.

As I did not see the individual from whom the virus was first obtained, I am unable to say that he really had primary syphilis.

I cannot, therefore, draw positive conclusions from the above cases, and only present the report as information.

On the other hand, many of the Confederate surgeons entertained views similar to those announced by Dr. Habersham, and denied that any of the cases of spurious vaccination were syphilitic in their origin or relations.

Thus, Dr. S. F. Stout, of Pulaski, Tenn., formerly Medical Director of the general hospitals attached to the Army of Tennessee, in his reply (dated near Pulaski, November 19, 1866) to my inquiries, says:

I am not satisfied that there occurred a well-authenticated instance of the propagation of secondary syphilis by means of the so-called spurious vaccine matter. I think that the injurious effects were chiefly produced upon persons already diseased syphilitic, scorbutic, or while living in an atmosphere infected by the causes of gangrene and erysipelas. A vast majority of these cases were those of individuals who had been previously vaccinated, and in very many instances the virus used was taken from the arms of re-vaccinated individuals. Thus, common pus, and even ichor, was no doubt inoculated, which produced effects similar to those that are caused by a wound received while dissecting a dead body, modified in many instances, no doubt, by the condition of the patient's health and the morbific influences to which he was exposed.

Prior to my assumption of authority to take steps to stop the evil, I am satisfied that there were several errors in practice among our troops. First, the order requiring all *soldiers* to be vaccinated, whether they had been previously effectually vaccinated or not. This order was literally interpreted and acted on by the superintendents of vaccination appointed by the Surgeon General. Secondly, many soldiers, ignorant of the characteristics of genuine vaccinia, vaccinated themselves, or each other, without consulting a surgeon. Thus, no doubt, common pus, and even ichorous matter, were often inserted. Thirdly, when variola first appeared in our army, so great was the fear of the disease, and the consequent anxiety to vaccinate everybody in the army, or in its vicinity, that the temptation to the surgeon to use any virus within his reach was very great. Thus, much matter was used which ought to have been rejected by surgeons.

In my investigations I could not learn of a single well authenticated instance in which due care had been taken in the selection of the virus, whether in the form of lymph, or of the dried scab, that was accompanied by the evils of so-called spurious vaccination, in a perfectly healthy individual, in an atmosphere uninfected by erysipelas or gangrene. Believing these conclusions to be correct, when as Medical Director of the hospitals I undertook to relieve the army of the evil, I made provisions to supply it with virus taken only from the arms of healthy children, who had *never before been effectually vaccinated.* By the zeal and energy of medical officers designated at every hospital post, from supplies of virus obtained from the Surgeon General, S. P. Moore, and Surgeon J. C. Mullins, superintendent of vaccination of my department, appointed by me, the army in the field and the hospitals in the rear were amply furnished with virus from healthy children. No soldier was vaccinated with matter taken from another soldier.

The supply was so abundant that there was not temptation to use any other part of the dried crust than the vitreous, mahogany-colored portion. I recommended that no soldier who had been vaccinated within a few years past, and who had the characteristic mark, should be revaccinated, unless positively known to have been exposed to variolous contagion; and especially, if he were laboring under any form of syphilis, or was scorbutic, or was living in an atmosphere infected with gangrene or erysipelas.

Under this practice the so-called *spurious* vaccination disappeared from our army, and before the close of the war it might be said to have ceased to exist in Georgia.

Having thus far entered into a statement of the impressions I have, and of facts bearing upon the subject, it may not be amiss to say to you that my observations and experience during the war has confirmed my faith in the prophylactic powers of the Jennerian virus. I use the term Jennerian to designate that vaccine virus which has been propagated from that originally supplied by Jenner. The immunity of so many thousands of soldiers and officers witnessed during the war, and the comparatively small number of the vaccinated who were attacked with variola or varioloid, enhance my estimate of the protective power of vaccinia, rather than diminishes it, as has been the case with many whose field of observation has been comparatively smaller than mine.

The testimony of Dr. E. A. Flewellen before the United States Military Court, in the trial of Henry Wirz, is of interest in this connection, in so far as it relates to the prevalence and nature of spurious vaccination in the Western Army of the Confederate States.

MEDICAL TESTIMONY—THE CONDITION OF THE PRISONERS IN THE HOSPITAL.

September 28, 1865.

Dr. E. A. Flewellen for the prosecution.

. . . .

VACCINATION.

Q.—Can you tell us what effect vaccination had upon your own soldiers and citizens?

The Witness—Do you mean spurious vaccination, as it is called?

Mr. Baker—Yes, sir.

A.—The first I ever heard or knew of spurious vaccination—

The Judge Advocate—State only what you saw or knew at Andersonville.

Witness—I know nothing about the vaccination at Andersonville.

Q.—Go on and state all you know about spurious vaccination anywhere throughout the Southern Confederacy.

The Judge Advocate objected to the question, on the ground that even if it could be proved that persons throughout the South were poisoned by means of vaccination, it would furnish no proof that prisoners of war at Andersonville were not so poisoned, and could not in any way exculpate any one who was inculpated by the evidence already brought before the court.

Mr. Baker argued that the question was proper. The defence proposed to show that the same effects experienced from vaccination at Andersonville had been experienced throughout the whole South; that the same matter used at Andersonville, was so far as could be ascertained, used in various places throughout the South, and had similar effects on soldiers and private citizens.

If the defense could show that this vaccine matter was used upon Confederate soldiers, and produced the same results as those testified to in the case of Federal prisoners, it would tend to rebut or disprove one of the elements of the alleged conspiracy.

The court, after deliberation, sustained the objection.

Witness.—I know of the effects of vaccination on the troops in Georgia.

Q.—State to the court what their effects were on your troops.

Objected to by the Judge Advocate, unless it could be shown that the vaccine matter used for the Confederate troops was obtained from the same source as that used on the Union prisoners.

After deliberation the objection was overruled.

A.—While the army of Gen. Bragg was at Tullahoma I was medical director, and I know that very great complaint was made to me as to the character of the vaccination practiced in the army. A large number of men were represented as unfit for duty. I think that one division represented nearly a thousand men as unfit for duty on account of spurious vaccination. I saw a number of cases in the early progress of the vaccination, but they presented nothing abnormal that I could detect. But, as it advanced, the cases seemed to have the appearance very nearly of syphilitic rupia. It diffused itself more or less over the whole surface. A large number of surgeons regarded it as a complication of vaccinia and syphilis. Finally they settled into the opinion that it was not syphilitic. There never was, I may say, any settled opinion among the surgeons of the Confederate Army as to what was the true character of this impure virus. (40th Congress, second session, House of Representatives, Ex. Doc. 23; trial of Henry Wirz, pp. 472-473.)

SMALL-POX EPIDEMIC IN MOBILE DURING THE WINTER OF 1865-6. BY J. C. NOTT, M. D., OF MOBILE, ALABAMA.

MOBILE, December 12, 1866.

Joseph Jones, M. D.,:

My Dear Sir—Your letter of the fifth reached me yesterday, and I regret to have to plead ignorance again on the subject in hand. I have had to treat a good many cases of spurious vaccination, but have no clear facts as to their *origin*. Many of them *look* syphilitic—rupial sores, etc.—they are more properly syphiloid. I am not sure but the ugly sores we saw in the army are as anomalous as many other forms of disease which seemed to result from crowded camps and hospitals, foul air, bad diet, etc.

Dr. J. T. Gilmore, who was a medical director in the Virginia Army, saw a great deal of this spurious vaccine, and has promised me to write you about it. We have in Mobile a medical society, and it is the duty of each member in turn to read a paper once a month. Some six or eight months ago, in the performance of this duty, I threw together some rough and hasty notes on vaccination, etc., which I send you in their rude state. If you can find any useful idea or suggestion, you are at liberty to use it as you like.

Very respectfully and truly yours, J. C. NOTT.

The extraordinary prevalence of small-pox in Mobile during the winter just passed, presenting all the characters of a true epidemic, deserves to be placed on record as a matter of history, and deserves much fuller detail than I propose at present to give it

The reason for this extraordinary prevalence of small-pox not only in Mobile, but more or less throughout the whole of our Southern States, is very obvious. It is now about ten months since the close of our civil war, which has thrown our population into great confusion; and the negroes having been suddenly liberated, have from various causes been congregated in towns, and freed from their accustomed restraint and the fostering care of former masters. A large portion of them had never been vaccinated, scarcely any vaccinated, and they therefore afforded an unprecedented amount of material for the disease. Fully nine out of ten of the deaths from small-pox have been among the freedmen.

The disease having been scattered by this class, through all parts of the city and surrounding country, the whole atmosphere became infected, and a true epidemic constitution established. A great many of the old citizens, both white and black, have been attacked by varioloid. The cases, however, among the better class, who have been in the habit of paying proper attention to revaccination, have been few and mild.

With regard to the proteection afforded by vaccination, I must say that it is difficult to imagine a more perfect triumph than that of the immortal Jenner. My own experience leads me to declare that I have not seen more than three or four cases of varioloid amongst those I have been in the habit of attending and revaccinating; but I must add that I have paid no attention to age; I have revaccinated young children as indiscriminately as the adults and aged, and have seen no appreciable difference in their susceptibilities either to vaccine or to varioloid.

It has been evident, from the intense epidemic constitution of the atmosphere, that we should, had it not been for vaccination, had at least three-fourths of our population attacked by small-pox. There have been treated in the pest house alone, up to the present date, March 20, 1866, about six hundred cases. One hundred and eighty cases are now under treatment in that establishment, and there seems to be no abatement in the progress of the disease. I think it would be within the mark to say that at least three thousand cases of small-pox of all grades had occurred in Mobile during the past five months.

The panic produced has caused almost all of our old citizens of all ages to seek revaccination, which have given some interesting results. Many adults, vaccinated in early life and exhibiting good cicatrices, have received the vaccine in a spurious form, though their systems had refused it several times previously since the first vaccination, thus showing that when an *epidemic influence* is prevailing, the vaccine is much more apt to take effect in some form. This fact has been noticed by writers on the subject, and has been very *striking in the prevailing* epidemic. In not a few, also, bearing good marks from childhood, who had repeated revaccinations in former years, the vaccine this year has taken perfectly and run its course regularly as in those newly vaccinated. Such patients, doubtless, were in danger of taking genuine small-pox

How long does vaccination, when done in childhood, protect against small-pox? Does it really *wear out* in a given time, or at all? Were I to judge by my own experience, it never wears out, and time has little influence on it. If the system is once *fully* affected, it is good for the life-time; in order, however, to be sure that the system *is* fully affected, it is proper to repeat the vaccination several times till the system fairly refuses good virus.

It should be remembered that when the population of a town is exposed to the influence of small-pox, or any other epidemic disease, a considerable per centage of them are not susceptible to the disease at *that time* and will escape it. Members of the same family will not communicate it to those around; even children sleeping in the same bed with others sick of small-pox will not take it. Why these immunities we know not, but yet the facts are indisputable.

So with the vaccine. Suppose you are called upon to vaccinate half-a-dozen children, and it is performed on them all at the same time and with the same virus. What happens? One may not receive it at all; in all the others it may take, showing its characteristic vesicle, but affecting the individuals in various degrees, thus showing different grades of *susceptibility*. In one a good vesicle will appear without constitutional symptoms, in another the vesicle may be accompanied by high fever, glandular swellings, etc., and the others will present intermediate grades of effect.

Now the one which did not respond at all to the vaccine virus, if exposed to small-pox, might not at *that time* take the disease, on account of a *temporary insusceptibility*, but at some future day under similar exposure might be attacked by confluent small-pox. The one which took the vaccine so fully as to develop severe local and general symptoms would probably be protected for life, against either vaccine or variola. The other children which had mild local symptoms, and little or no fever, if exposed to small-pox in after life would be attacked by varioloid in various degrees, according to the degree of susceptibility left in the system. If vaccinated after one or more years, the vaccine would again show to a greater or less extent its characteristic effects on some of the cases, thus proving that the system had not been fully affected by the first vaccination, and consequently not fully protected against the poison of small-pox.

Now in the case of these six children, it must be remembered that when they were vaccinated the first time, the morbid poison was *forced* upon the system without any regard to its *present* susceptibility. The system might be disposed to reject it entirely, or to receive it in various degrees, just as when exposed to contagious diseases in the natural way. Some children during the present epidemic, could not be brought under the influence, and in one case of a healthy child of three months old, it did not take until the ninth trial.

We have no criterion, by which we can tell before hand what is to be the effect of any disease on individuals. Suppose small-pox, diphtheria, or scarlet fever appears in a boarding-school, what happens? Some escape entirely, and the others are affected in all possible grades. Here you may say that the disease is again *forced* upon the subjects, and they receive or reject the poison in whole or in part, according to the condition of each individual. There is this great difference in the two cases. In the boarding-school example, the children take the disease in the *natural* way, and each one may receive or reject it as the system chooses; but in the case of vaccination the poison is *thrust into the blood* of the subject by the physician without any regard to the present susceptibility, and the system is compelled to fight the enemy as it best can. Under these circumstances it is rational to conclude, that in the case of vaccination, the system being forced, resists the influence of the virus to a certain extent in many instances, and thus leaves the system but partially protected, against the poison of small-pox.

Another important question arises as to the *duration* of the protecting influence of vaccine. Does it "*wear out*" in a given time, or at any time during our three-score-and-ten? I confess that I have never seen any facts to prove that it does wear out, where the system has been once *fully* affected. How many hundreds of individuals does every physician see in whom one vaccination in childhood protects perfectly against both small-pox and vaccination through life? There are ten thousand of such cases to prove that vaccine *does not* wear out. My own experience, which corresponds with that of the other physicians of Mobile during the present epidemic, goes to prove that in vaccination the virus just as often takes effect in children of all ages, from one year upwards, as in those vaccinated half a century previously. I have, during the past few months, seen scores of children bearing good marks, from the ages of one to eight or ten years, in whom the revaccinations have taken, or who have been attacked by varioloid. I have also seen scores of all ages who were insusceptible to both forms of this virus.

I have seen no evidence whatever that time has had anything to do with the protecting influence of vaccine; but much that it depends almost entirely upon the efficiency of the first vaccination. It is, however, proper to vaccinate again and again, as we have no criterion to go by but the repeated refusal of the system to receive it.

It has been curious to see how the epidemic constitution of the atmosphere has gradually deepened. It seems now to be breaking through all barriers. Some few have been attacked twice within three months by varioloid—many have had varioloid who have been vaccinated again and again—the vaccine has taken either well, or in spurious form, in some who had rejected re-vaccinations repeatedly before. In those who had never been vaccinated the vaccine has taken mildly and well, and the same matter has made very sore arms in those previously vaccinated.

Another interesting fact has been witnessed in attacks of small-pox in individuals while under the influence of vaccination.

Instances have been seen by our physicians in which the small-pox has broken out in subjects in all stages of vaccination, and within two or three weeks after vaccination has run its course through. There has been no fixed rule in the conduct of the small-pox under these circumstances, and no conclusion *a prirori* could be formed as to the violence of the attack. Most of the attacks of small-pox, while undergoing the influence of vaccine, assumed the form of varioloid, but some have been genuine and fatal small-pox.

It has been curious, too, to witness the infinite grades of those vaccinated. I have seen cases of varioloid with a single pustule—some five, ten or twenty, and so on, until the disease was lost in true small-pox. Gen. Withers had all the premonitory fever and other symptoms for four days, when a single well marked vesicle appeared on the forearm, and ran its course with all the characteristic marks of variola.

In connection with one of the points above alluded to, viz: the power of the system to resist morbid poisons when forced upon it, as is the case of vaccination, I will quote a very interesting paragraph from the Annuaire Encyclopedique, for 1864:

Until recently, it has been believed that the vaccine virus formed a characteristic vesicle. No matter what the diathesis or condition of the subject producing it might be, the virus was always the same, and could be used for propagation in others with impunity. In other words, that the vaccine virus in passing through a body could not be contaminated by any constitutional taint, and thus engender any other disease, such as syphilis, scrofula, etc.

"Such was the generally-received opinion," says the extract, "when it was ascertained at Rivalta, in Italy, in the first series of 46 children vaccinated the twenty-third May, 1861, with matter furnished by the vaccine pustules of an infant named Chiabrera, who seemed healthy, and in a second series of 17 children vaccinated with the pus taken from one of the children of the first, there had occurred symptoms of syphilis in 37 children of the first series, and in seven of the second series; then propagation of the infection to the mothers and to the nurses. Several of these infants died; several were fortunately cured. It was Dr. Cerise who first made these facts known in France."—*Union Medicale*, t. xii.

"This caused equal surprise in France and Italy. The first impulse was to doubt. It was also the subject of very serious investigation, which left no doubt either as to the reality of this sad experience, or as to the origin of the syphilis itself. Was it then necessary to admit that two poisons so unlike could combine? On the other hand, *why had a certain number of the children, both of the first and second series, escaped the infection—why had it been more powerful in some than in others?* Several physicians supposed that the infection had been transmitted by the *blood*, which is so often mingled with the vaccine, especially when the pustules are drained to the extent which had been necessary, in order to perform such a large number of vaccinations. The discussion was long and earnest. The result a resume of all the previous forgotten or unappreciated facts of the part touching the transmission of syphilis by vaccination, or by blood. Dr. Vennois was the principal promoter of the opinion, which, in the case of vaccination, attributed to the *blood alone* the faculty of transmission. He called to mind that previously to the facts of Rivalta he had published a memoir on this subject. Still, the doubt remained, the observations were not sufficiently precise, the facts could be explained in another way. It remained to make direct experiments as to the possibility of syphilitic infection by a minute quantity of the sanguine fluid. This direct experiment was made at Florence by Dr. Pellizari on medical students who volunteered for the purpose. He proved that a few drops of blood are sufficient to transmit syphilis. Thus it has been demonstrated that, to explain the facts, it is necessary to admit the *mixture* or *composition* of the two poisons, which upset all previous notions. It is also demonstrated that the fresh sanguine particles borne on the vaccinating lancet, at the same time with the vaccine, may transmit the syphilitic infection. From these facts it results that in future we should inquire with great care into the previous history of those children from whom we select our protecting virus."

Now, gentlemen, these facts are set forth with a fullness of detail and a weight of authority that challenge belief, and if borne out by future investigations are of immense practical value. In the present stage of the question it is our duty to take the benefit of every doubt and use the utmost precaution in selecting the virus we employ, and in removing it from the arm from which it is selected without its being contaminated by a particle of blood. There is, I think, another important point to be attended to, and it is this. When we vaccinate, the lancet always draws more or less blood. Not only should the lancet be thoroughly cleansed before it is used on another subject, but the identical matter should not be used on a second subject. We ordinarily mix the dry scab in this country with water on a piece of glass, and in the process of vaccinating a child the lancet is dipped several times into the mixture, thus necessarily adding to it some particles of blood. In this state another piece of glass is ordinarily placed over the one on which a part of the virus just used remains, and is carried about in the pocket for a day or two, or more, to be remoistened and used again on others. Now, to my mind, there are two strong objections to this method. 1. The virus is thus contaminated with blood. 2. From being kept in this moist state it becomes putrid, and not only fails to produce a good vesicle in succeeding subjects, but may hazard, from its putridity, the production of spurious vaccine, followed by bad sores and even symptoms not unlike dissection wounds. I throw these hints out for further investigation.

I beg leave to add to the above an extract translated from the "Annuaire de Medecine et de Chirurgie," 1864, which will be found interesting in connection with the above at this time:

"SYPHILITIC VACCINE AND THE MEANS OF PREVENTING IT."

"The contagiousness of the blood plasma being demonstrated to his satisfaction, as to the congenital contamination of the infant by the mother, M. Laroyenne admits in like manner the contagiousness of the serum that transudes under the vaccine pustule, and mingles with the vaccine without the possibility of being distinguished. Hence a new danger outside of the blood, and the vaccinal chancre, which cannot be avoided, except by most scrupulous examination of the subject from which it is taken, and of the mother if it is not too old. The subject vaccinated itself should not be overlooked, for it may also be a source of infection, according to the same author. In a collection of children to be vaccinated, if there be one infected, a common lancet impregnated with his blood may communicate syphilis to all those vaccinated after him, and to the subject from which the vaccine is taken. (*Gaz. de Lyon, No.* 12.) All this is possible, without doubt, but is not demonstrable, and is not even probable; for if the syphilis had so many chances of being communicated by vaccination, would it not be more frequent?

Without deciding on this accessory question, M. Dupaul, in making this important subject, the principal object of his annual report on vaccine to the Academy of Medicine, has recognized the reality of the transmission of syphilis by vaccination. Doubtless a discussion will clear up the points in dispute."

"*Vaccine-bearing Heifers.*—There exists in Naples, says M. Palasciano, besides the official vaccine institute for vaccinating from arm to arm, an establishment of Dr Galbiate, where the cow-pox is propagated through heifers, in sufficient number to supply many vaccinations. When it is wished to have a child vaccinated, one of these heifers is driven to the door, the conductor cuts out a pustule entire with a pair of scissors and hands it with a pair of forceps to the physician who executes the vaccination. The whole costs one dollar. This plan is also used in the army and colleges, and vaccination from arm to arm is practiced little except among the poor."—Crongrés de Lyon.

It is desirable that similar establishments should be founded in France, as it would be the surest means of escaping syphilitic vaccine.—Union Med. de la Seine Inf. p. 193.

M. Lanoix, who went to Naples to study this mode of animal vaccination, has tested it successfully and publicly at Lyons. He vaccinated a heifer of nine months old, in the iliac region and at the proper time transferred the matter to the arms of children. But we must not pass over another curious extract, which is as follows:

The milk of cows, submitted to this inoculation, would, according to Dr. Soubie, of Leghorn, have another advantage. By drinking the milk during the course of the inoculation, all the benefits of vaccination are obtained. He inserted the vaccine into the teat of a cow, and two fine pustules being developed, he made two children drink the milk. One, six months old, nourished by the bottle, took 600 grammes in two days, the fifth and sixth of the vaccine; the other, aged fourteen months, weaned, drank only half this quantity on the eighth day of the vaccine. A month after, having attempted to vaccinate them from arm to arm, they refused it, while the same matter succeeded perfectly in another inoculated at the same time."

These statements, to say the least, are interesting, and, coming from sources of high respectability, demand examination.

I have no data, by which to form an opinion, as to the relative frequency *and nature of* the foul gangrenous ulcers attendant upon vaccination in the United States forces. In the second section of the present inquiry, we have quoted the testimony of Dr. Hamilton to show that they were, to a great extent, as in the Confederate Army, referable to the depressed and scorbutic condition of the soldiers.

Dr. Woodward, in Circular No. 6, War Department, Surgeon-General's Office, p. 127, affirms that the accidents attendant upon vaccination in the United States Army, were generally regarded by the Medical officers, as "the expression of scorbutic or other cachectic conditions of the patients, and not due to any poisonous admixture with the vaccine virus; and it was frequently observed that the same scab which had produced a number of successful vaccinations, would, in other men vaccinated at the same time, produce the ulcers referred too."

It appears, however, that some of the United States Medical officers held that a portion at least of these abnormal affections following vaccination, were due to the admixture with the syphilitic poison, as will be seen by the following extracts from an article on Spurious Vaccination, by Geo. H. Hubbard, M. D., late Brevet Lieut.-Col., and Surgeon U. S. Vols., published in the Philadelphia Medical and Surgical Reporter, February 10, 1866, p. 103.

> On the last day of November, 1863, I reached Fort Smith, Arkansas, under an assignment to duty as Medical Director of the Army of the Frontier.
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> My attention was immediately called to several hundred men disabled in consequence of spurious vaccination, and a board of medical officers was soon after organized, by command of Major General Schofield, to investigate its origin, etc.
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> This Board made a detailed report, from which, from reports of other medical officers, and from personal observation, I was enabled to arrive at the following facts and conclusions.
>
> It was definitely ascertained that the virus which caused all these cases came from persons who had been vaccinated in the rebel army, or by rebel surgeons.
>
> This virus was used by ignorant medical officers and by self-inoculation among the men, till more than five hundred were infected.
>
> The Board reported that—"Soon after the operation was performed, the points at which the matter was inserted commenced to itch and inflame, and by the second or third day, pustules were formed, of a yellowish color, which rapidly increased in size, and in a few days burst. In some a scab formed, but in all, open ulcers were formed by the tenth day and which furnished a thin ichorous discharge.
>
> "At the time we examined the patients, some had well marked Hunterian chancre; some had large excavated ulcers, with edges elevated above the raw and surrounding induration; the centres, when not recently cauterized, were of a brownish hue—some, whose primary ulcers were about healed, had secondary symptoms, such as swelling and ulceration of the glands in different parts of the body; while others had pain and stiffening of the joints.
>
> "The disease was brought to the First Arkansas Infantry by deserters from the Confederate army, and in our opinion is syphilis."
>
> The following is from my official report to the Surgeon General:—"I have no reason to believe that in any one case did this virus produce a true vaccine pustule, or had any one of the protecting powers of vaccination.
>
> "The ulcers all possessed, in a greater or less degree, the well established peculiarities of venereal chancre, being of a specific and progressive nature, spreading in some cases to the size of a dollar, but usually about half that size; commonly round in shape, but often irregular, and usually of the depth of the true skin.
>
> "All had ragged, elevated, indurated, and overhanging edges, little sensitive to the touch or even to caustics; while the bottom of the ulcer, (especially under these indurated edges), was excessively sensitive.
>
> "All discharged dark ill-conditioned pus, which in many cases caused painful excoriation of the surrounding skin, and when transferred to other parts of the body, reproduced ulcers like the original; in this way, chancres were produced on the penis in several cases.
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> "Cases precisely similar occurred in the Indian Brigade, stationed at Fort Gibson, in the Cherokee nation.
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> "Acting Assistant Surgeon Miller, on duty at that post, reported as follows:
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> "Besides the cases occurring among the troops, it has spread among the people to an alarming extent by self-inoculation.
>
> "In a large proportion of the cases, consecutive symptoms have appeared; suppuration of the lympathic glands in the axilla, sore throat, exanthematous eruptions, etc.

"The cases occurring among the troops have received the ordinary treatment for syphilis, and in most cases with excellent results.

"The mischief was wide spread before the true character of the disease was recognized, so that few cases have had prompt abortive treatment, and many are, in consequence, permanently disabled.

"Nearly every case has required constitutional treatment, in addition to local treatment of the chancre.

"The milder caustic applications proving insufficient, in many cases, acid nitrate of mercury was used to clear away the indurated edges, when the ulcer usually healed rapidly under mildly stimulating applications."

"Six cases of well marked small-pox occurred in men who had suffered severely from this venereal inoculation.—Med and Surg. Reporter,—February, 19, 1866,—p. 103.

Up to the commencement of the recent civil war, the belief was almost universal that secondary syphilis could not thus be communicated by vaccination.

In the papers relating to the history and practice of vaccination, contained in the report of the General Board of Health, presented to both Houses of Parliament, by command of Her Majesty—London, 1857—Mr. Simon called for the opinion of the profession at home and abroad on the general question.

"Have you any reason to believe or suspect (a) that lymph from a true Jennerian vesicle has ever been a vehicle of syphilitic, scrofulous or other constitutional infection to the vaccinated person; (b) or that unintentional inoculation with some other disease, instead of the proposed vaccination, has occurred in the hands of a duly educated medical practioner?"

In answer to this question a writer in the British and Foreign Medico-Chirurgical Review (October, 1857, Review 3, Small pox and Vaccination), quotes the opinion of Hebra, which may be taken as expressing in a logical and lucid manner, the belief of the majority of the medical profession at that time.

This widely-grasping question (says Hebra) requires several separate answers, because queries are made—

"1. *Whether the lymph of a vaccine vesicle may, besides its peculiar virus, contain another infectious principle—e. g., that of syphilis?*

"2. *Whether constitutional non-infecting diseases, as, for instance, scrofula, may be transmitted by the inoculation of cow-pox matter?*

"3. *Whether a vaccine vesicle possesses such characters that it may easily be distinguished from other similar vesicles, blebs or pustules?*

"(I) The transmissible infectious principles which have hitherto been recognised, by means of inoculation, are the syphilitic virus contained in the pus of a chancre; and the virus contained in the cow-pox vesicle and the small-pox pustule. The question, therefore, simply is, whether these morbid poisons have ever been mixed? Whether inoculation has ever taken place with such a mixture? And what results were obtained by such an operation? It is well known that compendious answers have, for some time past, been offered to these questions, chiefly the result of Sigmund's experiments. These answers agree in the following respects:

"Inoculation with secretions of this kind, viz: containing, as it were, several special poisons, either produced no effect at all, or only generated a chancre, by inoculating [illegible] mixture of pus from the chancre and vaccine lymph; and only cow-pox, by inoculatin[illegible] a combination of vaccine lymph and blenorrhagic matter. Hence, one morbid state onl[illegible] was produced, either cow-pox or syphilis; the latter circumstance being a proof that bot[illegible] poisons are not *simultaneously transmissible.* This opinion is supported by the experienc[illegible] of Heim, Ricord, Bousquet, Taupin, Landouzy, Friedenger, etc.

"(II). It is maintained in many quarters that the blood of persons suffering from se[illegible] ondary syphilis may serve as a vehicle to the infectious principle; but were even th[illegible] theory found correct, it would have no prejudicial effect on the practice of vaccinatio[illegible] because we know from experiments made for the purpose (Heim), and from accident[illegible] inoculation, that regardless of the quality of vaccine lymph, the latter may be inoculat[illegible] from syphilitic upon sound individuals; and on the other hand, from sound subjects up[illegible] such as are under the influence of systemic syphilis, without propagating syphilis alo[illegible]g with the cow-pox.

"What has here been proved of syphilis, must, *a fortiori*, hold good as regards other constitutional morbid states, as direct inoculations with the secretions peculiar to these *diseases have* always yielded a negative result.

"But, although it is abundantly proved that scrofula, tubercular affections, rickets, cancer and other blood diseases cannot be transmitted by means of their own secretions, or along with the vaccine lymph, we should nevertheless, if possible, avoid vaccinating diseased persons, because experience has taught us, as regards adults and children, that the phenomena of vaccination may awake—i. e., render worse—dormant affections; and that, moreover, the cow-pox vesicle easily degenerates upon such individuals. These latter vesicles are, nevertheless, adapted for further propagation, even when they take an imperfect development, because a positive result, a regular development of the vesicle, and sufficient protection against small-pox, have been observed in cases where vaccine lymph was transferred from weakly, scrofulous and rickety subjects upon perfectly sound individuals.

"(III.) Every morbid appearance on the cutaneous envelope has its own peculiar characters, by which it may be distinguished from all other similar phenomena; the vaccine vesicle presents, in the like manner, sufficiently striking peculiarities as to form, size, number, locality and peculiarity as regards its course, to enable the observer easily to establish a distinction between the same and other vesicular, bullar or pustular eruptions."

In 1856 Mr. Simon, the medical officer of the Board of Health, addressed a circular to members of the medical profession in England and other countries, as well as to the foreign governments, inquiring, among other things, "*whether they had any reason to believe or suspect that lymph from a true Jennerian vesicle has ever been the vehicle of* syphilitic infection."

From the very large number of replies which Mr. Simon obtained, we select or condense the following:

Mr. Acton—"I unhesitatingly affirm that I have never witnessed a single case that will bear out the supposition. Although I have for a long time been convinced that infection cannot be thus introduced into the system, I have never felt myself justified in directly vaccinating healthy children from the virus of vesicles obtained from syphilitic infants."

Dr. Addison—"To both these propositions my own experience would return a negative."

Dr. Alderson—"No; but as a commissioner of the Vaccine Board, I am aware of a single instance, some years ago, of bad results following vaccination with a lancet ascertained to have been foul and accidently used in ignorance."

Dr. Balfour—"In no instance (in army vaccination during eight years) did any symptoms ever occur, or any appearance present itself, which could lead to the suspicion that the lymph had been the vehicle of syphilitic, scrofulous or other constitutional affection."

Dr. Barlow—"I have no certain proof that it is even the vesicle of such infection, though I have suspected it in the case of syphilis."

Dr. Beatty—"I do not think such a thing possible."

Dr. Bright—"I have never seen such a case."

Dr. Brinton—"No."

Sir. B. Brodie—"I have no reason to believe that vaccination was ever the means of introducing syphilis, or scrofula, or any other constitutional disease into the system."

Dr. George Burrows—"I have no reason to believe or suspect that the true vaccine lymph has ever been a vehicle of syphilitic, scrofulous or other constitutional infection to the vaccinated person; but I do fear and suspect that unintentional inoculation with some other matter than the true vaccine lymph has occurred in the hands of legally qualified medical practitioners."

Mr. George Busk—"I have never witnessed any circumstance which could lead to such a belief or suspicion."

Mr. Ceely—"Although I have heard of such events, I have never witnessed anything of the kind in my own practice of more than thirty-five years."

Sir James Clark—"I see no reason to believe the occurrence of either circumstance."

Sir Philip Crampton—"I have no reason to believe that lymph from a true Jennerian vesicle has ever been the vehicle of any other disease."

Mr. Theodore Davis—"I have never seen (and my observation extends over some thousand cases) the slightest reason to suspect that any other disease has been communicated by vaccination."

Mr. Erichsen—"I do not believe that any *constitutional* disease can be communicated through the medium of vaccine."

Dr. Arthur Farr, Dr. Robert Ferguson, Dr. Greenhill, and Mr. Thomas Hunt answered in the negative.

Sir William Jenner—"In the discharge of my duties as Physician to University College Hospital and the Hospital for Sick Children, I must have had, during the last six years, more than thirteen thousand sick adults and children under observation; and in no case have I reason to believe, or even suspect, that any constitutional taint had been conveyed from one person to another by vaccination, or that any other disease had been unintentionally inoculated."

Mr. Jones, of Chesterfield—"During the past six years, I find I have vaccinated almost 1,052 children. The result of my experience leads me positively to state that in no instance have I seen a true Jennerian vesicle—the vehicle of syphilitic, scrofulous or other disease."

Dr. P. M. Latham—"I have never met with the slightest proof of it; and the suggestion of its being possible amazes me."

Sir Charles Locock and Mr. Lord answered in a like negative manner.

Mr. Marson—"I have no reason to believe or suspect that lymph from a true Jennerian vesicle has ever been a vehicle of syphilitic, scrofulous or other constitutional infection to the vaccinated person. I answer on this point from the experience of having vaccinated upwards of 40,000 persons.

Dr. Noble, of Manchester; Dr. Robertson, of Manchester; and Dr. Stokes, of Dublin; replied decidedly in the negative.

Mr. Tompkins—"After an experience of twenty-one years as a vaccinating surgeon, and having vaccinated upwards of 40,000 children, I have never known syphilitic, scrofulous or other constitutional affection, to be communicated by the operation."

Mr. B. Travers—"My experience has not furnished me with reason to believe that the true Jennerian vesicle has ever been a vehicle of syphilitic, scrofulous or other constitutional infection."

Sir Thomas Watson—"I have never had any reason to believe or suspect that lymph from a true Jennerian vesicle has ever been a vehicle of syphilitic, scrofulous or other constitutional affection."

Dr. West—"None whatever."

Dr. C. J. B. Williams—"I do not recollect an instance in my own experience in which such untoward results have followed vaccination, but I have heard of such, and I cannot but think that they were not the necessary consequences of vaccination, but of its indiscriminate and careless performance, as in taking the virus from the diseased subjects."

Mr. Erasmus Wilson—"No. I went frequently with parents who believed an eruption under which their child suffered to have originated in vaccination, but the origin was in reality traceable to a different source."

On the other hand, the following surgeons and physicians testified to their belief that syphilis might be communicated by vaccination:

Mr. Ackerly, of Liverpool—"I have no doubt that syphilis has been communicated from a diseased to a healthy child by means of vaccination."

Dr. J. R. Bennett—"I have suspected that syphilitic disease may be communicated by vaccination, and I would not willingly sanction vaccination from an unhealthy child, however perfect might be the Jennerian vesicle whence the lymph was derived."

Dr. Fleming, of Glasgow—"I have a suspicion that I have once seen syphilitic disease communicated in this way, but it is a very difficult point to ascertain with perfect accuracy."

Mr. J. Hutchinson—"I believe that I have seen four or five instances in which local syphilitic affections were induced by vaccination, performed under ordinary circumstances, and by duly qualified men. In one or two of these the constitution suffered also, as seen by the appearance of disease in several parts, but in others it was perceptibly affected."

Dr. Laycock—"I think that this may be reasonably believed or suspected, and think a duly educated practitioner may be a negligent, careless or thoughtless practitioner, and may inoculate unintentionally with some other disease. Our knowledge of morbid poisons is too imperfect to speak positively as to what may happen or what may be suspected, reasonably or not."

Dr. Lever—"I must say *yes*. I have known syphilis communicated to a child by the hands of a supposed but legally educated medical practitioner."

Mr. Martin, of Bristol—"I believe it is sometimes the vehicle of communicating the syphilitic taints to children previously perfectly free from it. * * * I have on many occasions, been called to cases of eruption markedly syphilitic, occurring after vaccination, and in which I have failed to detect the slightest taint in either parent or in the other children of the same marriage."

Mr. Morley, of Sunderland—"I have had one case where the lymph, sent me by a medical friend who is a public vaccinator, did produce a syphilitic taint."

Mr. Startin—"This is a difficult question to answer satisfactorily, as the reply must rest upon what is regarded as a 'true Jennerian vesicle,' as this vesicle, in a subject *suffering* under constitutional or acquired syphilis, or from purigo, or even scabbies, might be still a 'true Jennerian vesicle,' though not a pure one, and these maladies I have many times seen transferred from such a vesicle. I have also seen the same maladies inoculated by public vaccinators from unintentional vaccination "

Dr. Whitehead, of Manchester—"I have seen several instances of the transference of the syphilitic taint through the medium of vaccination, the lymph having been taken from a true Jennerian vesicle, or presumed to be so at least in a tainted infant."

The opinions of the Continental physicians on this subject were equally divided.

Mr. Simon's own opinion at the time he wrote (1857) was that in the cases then on record, in which persons pretending to vaccinate did really effect a syphilitic inoculation, it is almost certain that the matter of syphilis was used by the vaccinator instead of vaccine lymph.

Since the publication of the Rivalta outbreak, however, Mr. Simon appears to have modified his opinion, and is disposed to believe that cases of reported vaccine-syphilitic inoculation have arisen from the admixture of syphilitic matter with the vaccine in such manner as might readily be comprehended to occur amongst careless and dirty people.

We shall examine these doctrines and conclude these *Researches on Spurious Vaccination*, with an examination of the following questions:

1. *The possibility of communicating tuberculosis and cancer by inoculation.*
2. *The possibility of communicating secondary or constitutional syphilis by inoculation.*
3. *The possibility of communicating the poison of syphilis through the medium of vaccine virus.*

INOCULABILITY OF TUBERCLE.

1. True tubercle is organized; that is, it is composed of living cells, and during its growth it resembles, to a certain extent, fresh granulations. These soft fragile cells and nuclei, resembling the gland cells of the lymphatic glands, are to be regarded as the characteristic living element of tubercle. According to this view, tubercle resembles malignant growths.

M. Villemin's researches appear to have settled the question of the inoculability of tubercle. This observer affirms that he had succeeded in reproducing tubercle by inoculation, again and again, in rabbits, not only when taken from the human subject, but also when derived from the cow; and further, that the tubercular matter thus produced in one rabbit, could be in like manner transmitted to another. (Gazette Hebdomadaire, 1866.)

Dr. Lebert, professor at Breslau, has succeeded in introducing tubercle into the system by subcutaneous injection, and thus confirmed M. Villemin's experiments. Dr. Lebert's experiments were made with Guinea pigs and rabbits, and both grey and yellow matter were employed, as well as liquid from the cavity; the nape of the neck was the spot chosen for injection, and the amount introduced varied from fifty centigrammes to a gramme, diluted and triturated with distilled water. The result of his experiments was the finding of tubercles not only in the lungs, but in other organs, as the liver, spleen, plurae and pericardium. In some experiments, the tubercles were found in large portions of the lymphatic system. Microscopic examination revealed the identity of the tubercles thus formed in animals by inoculation, with those of man.

Tubercle still further resembles malignant growths, in that the original growth causes the formation of new tubercles in its neighborhood and thus gradually infects large tracts of living and previously healthy tissue. It is possible in many cases, by carefully comparing the symptoms during life, with the results of post-mortem examination, to trace the gradual propagation, of tubercle from a well defined centre.

The question of the contagious or non-contagious nature of tubercles is one of vast importance, as will be shown by the following statistics and facts:

MORTALITY OCCASIONED IN NEW ORLEANS, LOUISIANA, AND THE VALLEY OF THE MISSISSIPPI BY PHTHISIS (TUBERCULOSIS, PHTHISIS-PULMONALIS, CONSUMPTION).

During the first six months of 1882 phthisis-pulmonalis caused the following mortality:

MONTH.	White.	Colored.	Total.	MONTH.	White.	Colored.	Total.
January	38	34	72	April	34	29	63
February	53	35	88	May	45	28	73
March	50	33	73	June	44	23	67
				Total	254	182	436

During the last six months of 1882 phthisis-pulmonalis caused the following mortality:

MONTH.	White.	Colored.	Total.	MONTH.	White.	Colored.	Total.
July	42	24	66	October	44	24	88
August	37	34	71	November	43	29	72
September	32	23	55	December	55	34	89
				Total	253	168	421
Total, twelve months					507	350	857

During the first six months of 1882 tabes-mesenterica caused 97 deaths—whites, 58; colored, 39; syphilis, 17 deaths—7 whites and 10 colored. During the last six months of 1882 tabes-mesenterica caused 63 deaths—whites, 55; colored, 18; syphilis, 17 deaths—whites, 10; colored, 7. Leprosy occasioned two deaths, amongst only whites, during 1882.

It will be observed from a critical examination of the mortuary records of 1882, that phthisis-pulmonalis heads the list of diseases in its fatal effects, occasioning a total mortality of 857—whites, 507; colored, 355. Tabes-mesenterica caused deaths: whites, 113; colored, 57; total, 170.

These two diseases, phthisis-pulmonalis and tabes-mesenterica, caused 1,027 deaths, or more than one sixth of the total mortality of 1882.

Relative to population, phthisis was most fatal in the colored race.

During a period of thirty-four years, 1846-1880, 10,950 cases of phthisis-pulmonalis were treated in the Charity Hospital of New Orleans, with a mortality of 5,600: 51.2 per cent.

During thirty-six years, 1846-1882, phthisis-pulmonalis occasioned in New Orleans 25,828 deaths; during the same period tabes-mesenterica occasioned, 4,950 deaths. Total deaths by these two diseases during the period specified, 30,778.

During the same period, 1844-1882, yellow-fever occasioned 28,745 deaths.

These statistics show that phthisis-pulmonalis demands the first and highest consideration at the hands of the sanitarians and physicians of New Orleans.

It is also worthy of note that the mortality occasioned by phthisis-pulmonalis is quite uniform throughout the great Valley of the Mississippi, with its 20,000,000 of inhabitants; and if the mortality be placed annually at 500 deaths in every 200,000 inhabitants (an estimate below the real mortality from phthisis), then not less than 50,000 inhabitants of the *Mississippi Valley* annually fall victims to phthisis-pulmonalis.

Yellow-fever has only at long intervals extended its ravages beyond the cities located near the Gulf of Mexico, and the most extravagant and wild calculation cannot claim a mortality in 1878, when it is supposed to have been most widely diffused through the Valley, of over 20,000 victims.

After careful examination of the statistics of 1878, I am inclined to place the mortality from yellow fever at not more than 15,000.

Phthisis pulmonalis visits annually every hamlet, village, town or city of the great Valley, and its causes and prevention should be of daily consideration; and State and national legislation should not be invoked alone for the prevention of yellew fever, small-pox and cholera; neither should the truth be obscured, and national and State legislation perverted by a constant appeal to popular prejudice, ignorance and fear with reference to yellow fever.

The relations of phthisis to moisture and to faulty construction of dwellings and to the low and badly drained localities of New Orleans, were considered in the Annual Report of the Board of Health of the State of Louisiana for 1881; see pp. 188—190.

It is however of importance that we should briefly consider the conditions which give rise to phthisis, and also examine the important question as to the contagious or non-contagious nature of tuberculosis.

ÆTIOLOGY OF PHTHISIS.

The conditions which give rise to phthisis are varied and diverse, but may be arranged into general and local causes; in the former, the constitution of the individual and the functions of nutrition and assimilation appear to be first involved; in the latter the lungs are the primary seat of the disease, and changes in their epithelia and parenchyma lead to products of a retrograde kind, through which the lymphatic and vascular systems and the constitution generally become affected. The general have been called constitutional and the local inflammatory.

Dr. C. Theodore Williams and other systematic medical writers, have assigned the following as the most important causes of phthisis?

1. Family predisposition.

The influence of heredity as a cause of phthisis cannot be doubted.

2. Local infection.— Chronic inflammatory affections of organs and textures leading to the formation of caseous centres.

3. Acute febrile diseases.—Continued fevers, measles and scarlatina, act partly by exhausting the system, and partly by bequeathing to the individual the legacy of caseous matter, either in the lungs or glands, which form the centres of subsequent tuberculisation.

Syphilis.—Syphilis by its debilitating influence predisposes to phthisis; but it also appears to act as a cause capable of developing a limited consolidation, and a form of a laryngeal phthisis, characterized by ulcers in the larynx and pharynx.

5. *Debilitating conditions.*—Miscarriages, unfavorable confinements, over-lactation, insufficient food and alcoholism are recognized causes of phthisis.

6. *Bad Ventilation.*—Consumption is more rife among persons of indoor occupations than among those employed out of doors. Of nearly 6000 cases of phthisis admitted into the Brompton Hospital during ten years, two-thirds had indoor occupations. Among them milliners, seamstresses and tailors furnish the largest quota, who all live in close rooms to which they are almost entirely confined. Phthisis frequently attacks printers, compositors, tailors and tradesmen who live in hot gas-lit shops, and often sleep in miserably ventilated bed-rooms.

7. *Climatic Influence.*—A moist atmosphere is more favorable to the development of consumption than a dry one. Dr. Gurlbert has shown that a combination of heat and moisture, as exemplified in the litoral of Peru, in the West Indies, etc., produces an acute form of consumption, largely prevalent in these districts, attacking the abdominal organ in addition to the lungs.

8. *Dampness of Soil*—The researches of Dr. Buchanan have demonstrated that the death rate from phthisis in the Districts of Surrey, Kent and Sussex depend, to a great extent, on the geological formation of the soil; for while in the light and sandy strata deaths from phthisis are rare, in the heavy impentrable ones, in which clay predominates, the mortality from this cause is high.

The conclusion that wetness of soil is a cause of phthisis to those living on it, has been confirmed by the Registrar General of Scotland, and Dr. Bowditch, of the United States; the latter testifying that the law holds good, not only as regards villages and towns, but even as regards individual houses—the houses on clay becoming the foci of consumption, whilst others, but slightly removed from them, but on a dry soil, wholly escape.

The pine regions, with their dry, sandy, porous soil, of Louisiana, Alabama, Florida, Georgia and Mississippi are noted for their freedom from phthisis, and are famed as health resorts for those suffering with this disease.

The difference in the relative salubrity with reference to phthisis between New Orleans and the neighboring pine hills is due, not to variations of temperature, but to the absence of moisture in the atmosphere and of water in the soil of the latter.

9. *Inoculation*—From the time of Laennec until the present, experiments have been carried on by numerous observers to ascertain whether tubercle is, or is not inoculable; and the results of these experiments prove that in guinea-pigs and rabbits tubercle can be produced artificially by the insertion under the skin, not only of tubercle, but of various other materials, such as pus, putrid muscle and diseased liver taken from non-tuberculous subjects. There was nothing specific in the results of the inoculations, for the materials most efficient in producing artificial tubercle were taken from low pneumonia, pyæmic abscess, etc.; while human tubercle, phthisical sputa, pus and putrid muscle were less successful. It was found by Dr. Burden Sanderson that tuberculosis might be induced in the guinea-pig by the insertion of a cotton thread under the skin, but if the seton was steeped in carbolic acid, no tubercle was produced. To ascertain the results of mechanical injury without exposure to air, the scapulæ of guinea-pigs were fractured subcutaneously. No tuberculosis resulted. It is evident, from these experiments, that tubercle is not so effective for infective purposes as many other materials, and especially those of a septic nature, as pyæmic pus and putrid muscle. These facts warrant the conclusion that tuberculosis is closely associated with pyæmia, and among animals the difference between these two diseases would appear to be one merely of degree.

10. *Infection*—The idea of infection being the cause of phthisis has been received and extended in England and Germany. The evidence of the Brompton Hospital negatives the idea of a contagion such as is present in small-pox or scarlet fever; for it has been demonstrated that the percentage of acquired pththisis cccurring amongst the resident staff of the institution is less than that of most general hospitals.

Virchow and most English physicians strongly maintain that phthisis may be communicated from husband to wife, and Dr. Herman Weber has lately indicated, by some striking cases, the danger of pregnancy to the *wife of a consumptive.*

Cohnheim, who appears to have confirmed by his own experiments the doctrine of specific infection, holds, in opposition to the above views, that the test of tubercle is its inoculability, and prefers this to any structural test. He considers that tubercular particles are conveyed by means of organisms to the lungs, thus affecting the pleura and bronchial glands, later the larger bronchi. The infection of the intestinal canal arises, according to Cohnheim, from swallowing the sputum.*

Dr. Koch, an eminent German mycologist, distinguished for his classical work on anthrax and infectious surgical diseases, has advanced the view that phthisis is of parasitic origin, and claims that he has proven by direct experiments on animals that a certain bacillus, which he calls *bacillus tuberculosis*, is the cause of this disease.

The recent appointment of Dr. Koch as Imperial Councillor and Chief of the Laboratories of the National Board of Health of the German Empire, has given great weight to his statements, and his conclusions as to the ætiology of phthisis have been indorsed by some distinguished microscopists and physicians in Germany, England and America. The news of this great discovery of Koch have been spread by the newspapers throughout all civilized nations.

Recently the low organism which is alleged to be the cause of general tuberculosis and phthisis was exhibited to the pathologists and physicians of Philadelphia by Professor Whittaker, of Cleveland, O., by invitation of the College of Physicians.

Dr. H. D. Formad, lecturer on experimental pathology and demonstrator of morbid anatomy in the University of Pennsylvania, has also publicly demonstrated, before the Philadelphia County Medical Society, the existence of this organism in the sputum of patients suffering with this disease in the Philadelphia Hospital.

The discovery of Koch and his theory, which corresponds with the prevailing opinion that there must be a specific poison of some kind characteristic of phthisis transmissible from person to person and from animal to animal, and from animal to man, through food, water, air and cohabitation, followed to its logical conclusion leads to most important results.

It is said that in Germany, by imperial order, in military hospitals phthisical patients are separated from other cases, as carefully as small-pox patients; and even in this country the people begin to regard consumption as eminently contagious.

The adoption of the views of the contagionists will, without doubt, lead to much mental and physical suffering. The wife will look with suspicion, if not with abhorrence, upon her sick husband; the hale and hearty husband will abandon his feeble wife; and the sick child will be isolated and pass the remaining days of suffering in solitude.

During the experience of more than twenty-five years spent mainly in the sick-room and in the wards of civil and military hospitals, the opinion has grown into a strong conviction that tuberculosis (consumption) phthisis pulmonalis is *not contagious* in the same manner as small-pox, measles or scarlatina.

The following conclusions and propositions recently enunciated by H. D. Formad, M. D., of the Medical Department of the University of Pennsylvania, are worthy of consideration, in connection with the foregoing facts:

(a) The predisposition to tuberculosis in some men and animals, the so-called scrofulous habit, lies in the anatomy of the connective tissue of the individual, the peculiarity being a narrowness of the lymphatics, and their entire obliteration by cellular elements.

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* "A Dictionary of Medicine, Including General Pathology, General Therapeutics, Hygiene, and the diseases Peculiar to Women and Children by Various Writers." Edited by Richard Quain, M. D., F. R. S. London: Longmans, Green & Co., 1882. Pp. 1166–1168.

(b) Only beings with such anomalous structure of connective tissue can have primary tuberculosis, and such animals invariably do become tuberculous from any injury resulting in inflammation, although it may remain local and harmless.

(c) Scrofulous beings can have no other than a tuberculous inflammation, although it may remain local and harmless.

(d) Non-scrofulous men or animals may acquire the predisposition to tuberculosis through mal-nutrition and confinement, the latter bringing on the above mentioned peculiarities in the connective tissue.

(e) No external etiological influences are necessary to cause tubercular disease other than those which ordinarily produce inflammation, and even scrofulous beings will not become tuberculous unless local inflammation is set up.

No inflammation, no tuberculosis.

(f) Non-scrofulous animals, so far as can be established now, may acquire tubercular disease through injuries of serous membranes, viz: peritoneum, pleura, etc. And even here, without any special virus whatsoever, clinical observations on the post mortem table show similar conditions, and prove the same in men.

(g) The *bacilli*, which is the merit of Koch to have first proved to infest tissues affected by tubercular disease, are not necessary for its causation, even if a special organism exist and be really possessed of such property.

The presence of bacilli is secondary, and appears to *condition* the complete destruction of the tissue already diseased and infected by them, and this destruction is in direct proportion to the quantity of the organism.

The tuberculous tissue seems to serve merely as a nidus for the growth of the bacillus.

(h) An analysis of Koch's experiment shows that he has not proved the parasitic nature of phthisis, or that there exists a special bacillus tuberculosis; so that the infectiousness of tubercular disease is still ***sub judice.***

(i) From the result of microscopical and post mortem observations, and clinical investigations, the conclusion seems to be justified that ***phthisis is not a specific infectious disease;*** but that the individuals suffering from tubercular disease are specific themselves, originally, and form a specific variety of mankind, the *scrofulous.*

11. *Local Causes*—The local causes of phthisis are those which injuriously affect the bronchi and air passages, causing large epithelial proliferations and various inflammatory lesions, followed by thickening and induration of the alveolar walls, and in time caseation or fibrosis. Bronchitis and pneumonia are fruitful sources of phthisis.

12. *Trades and Occupations Giving Rise to a Dusty or Gritty Atmosphere.*—The constant inhalation of particles of flint, iron, coal, hard clay, and even of cotton, flax and straw, as is the case in certain trades—such as stonemasons, fork and needle grinders, colliers, potters, cotton carders, chaff cutters, and others—has been shown by Dr. Greenhow to induce phthisis. The various irritating particles have been detected, microscopically and chemically, in the lungs, where they appear to cause great irritation, followed by thickening of the bronchi and subsequent induration of the lung tissue, with increase of pigment. Intermingled in the consolidations are found gray and yellow tubercle, and also extensive cavities, proving the identity of this disease with phthisis. (A Dictionary of Medicine, etc., edited by Richard Quain, M. D.; London, 1882; p. 1168.)

It is not my design to discuss, at this time, the cause and mode of origin of tubercle, or its relations to inflammation, and to defective nutrition; my design has been simply to show that there are facts and experiments proving the possibility of transmitting the disease from one animal to another by inoculation. And whilst we are unacquainted with a single fact which illustrates in any manner the relations of vaccination to tuberculosis, at the same time it must be admitted that we need farther experiments and light upon this subject; and we know just enough to create a prejudice against the indiscriminate use of vaccine matter from scrofulous and tuberculous subjects.

POSSIBILITY OF TRANSMITTING SCROFULA BY VACCINATION.

Dr. Edward Ballard, in his valuable Prize Essay on Vaccination, proposed the following question:

"*Is there any reason to believe that scrofulous affections or cutaneous diseases are ever communicated by means of vaccination?*"

"In replying to this question we may freely admit that sometimes scrofulous manifestations do succeed the vaccine disease, and, moreover, that it is not a rare event for certain eruptions on the skin, such as eczema or the 'crusta lactea' of authors, to appear shortly after vaccination. But it does not follow from this that the lymph which has been over it, as mothers are very apt to fancy, the cause of the attack, or that it has been derived from an unhealthy child. The quality of vaccine virus as we shall see presently, is not regulated by any special healthiness or unhealthiness of the child who furnishes it, in the sense that it partakes in any way of that child's peculiar constitution. It is the same from a scrofulous or ricketty infant as from a robust one; it is vaccine virus weakened and deteriorated somewhat, perhaps in its energy, but nothing more. Besides, if it were contaminated—if, it did partake of the constitution of the vaccinifer—what then? Is scrofula a disease capable of being communicated by inoculation of a secretion from one subject to another? or the skin diseases, so commonly laid to the charge of bad lymph, capable of a similar mode of transmission? Nothing of the sort. Neither of them are contageous, neither of them inoculable—although the very secretions and material itself be used to make the attempt with. These maladies arise in a very different manner. How scrofulous affections generally arise I have already had occasion to point out; and I have only to add that skin affections, such as eczema, strophulus, etc., are very common diseases in infants constitutionally predisposed to them, and especially during dentition, or when children are supplied with food of an improper character, or when cleanliness is neglected. Glandular swellings, also, about the neck are often associated, as a result of the local irritation, with eczema of the head and face, if at all extensive. And these things happen just the same in unvaccinated children as in vaccinated children, and was observed just as often in the days when vaccination was unknown as they are now; and they originated then from just the same causes as they originate in now. The most that can be said about their relation to vaccination is that the disturbance of the system in the vaccine disease may sometimes, like any other constitutional disturbance, or like small-pox itself, promote or arrest in the manifestation of a scrofulous taint if pre-existent, or may arrest other causes which alone have been insufficient for the appearance of an eruption on the skin. I cannot express the relation borne by vaccination to such outbreaks of cutaneous disease better than it has been statedby Mr. Paget:

"When eczema, impetigo, etc., occur, as in any sense, a consequence of vaccination, the explanation is to be found in the fact that vaccination produces a certain amount of feverishness, and is followed by a few days loss of strength—states which, though they are quite insignificant in moderately healthy children, are favorable to the evolution of any constitutional disease or blood disease to which a sickly child may be liable. In children and adults alike it is certain that a tendency to the external manifestations of eczema and the other diseases above named may exist for many weeks or months, and yet not take effect till some accident disturbs the health, and wakens, as one may say, the form of retention or repression of the morbid tendency in the blood. There is, indeed, scarcely a blood-disease of which evolution may not thus be determined or hastened by an accidental injury, or by casual loss of health. When, therefore, eczema, or any such disease, so appears after vaccination that the one may with any reason be regarded as the consequence of the other, the vaccination may be considered to have done no more than any accidental injury would have done. Indeed, even among ignorant persons, the blame of these diseases is not nearly so often laid on vaccination as it is on accidental blows, falls, frights, colds, surfeits, and other such things. Perhaps the most common expression of all is that a child cannot even get so much as the scratch of a pin but what it brings out an eruption, or 'is followed by an abscess.' Now vaccination may do, though I believe it very rarely does, what these small accidents may do, namely, by disturbing the general health it may give an opportunity for the external manifestation and complete evolution of some constitutional affection, which, but for it, might have remained rather longer latant."

But so deeply rooted is the belief in some minds that, because these maladies sometimes succeed the vaccine disease, therefore they are caused by it directly and solely; that rather than run a remote risk of what mostly is by no means a serious ailment, of what may occur in a predisposed child even if vaccination be not performed, mothers will prefer to accept for their offspring the chances of small-pox and all its dangers."—Vaccination: Edward Ballard, pp. 272-275.

INOCULABILITY OF CANCER.

Dr. George Budd, of London, in his valuable work on diseases of the liver, has recorded a large number of facts to show, not only that cancer may be disseminated by *inoculation*, or by the mere contact of a sound part with a part affected with cancer, without any direct vascular connection between them; and by cancerous matter conveyed by lymphatics and veins to other parts of the body; but that cancer may even be propagated by inoculation, or by injection of cancerous matter into veins from one animal to another.

The facts recorded by Dr. Budd illustrate in the clearest manner the first two modes of the dissemination of cancer, in the human being; and to support the third proposition he cites the following experiments:

Professor Langenbeck injected into the veins of a dog some pulp taken from a cancer which had just been removed from a living body. At the end of some weeks the dog began to waste rapidly. It was then killed, and several cancerous tumors were found in its lungs.

Another instance to the same effect, taken from a German periodical, is related in the Provincial Medical Journal for September 23, 1843. Some cells were collected from a black liquid in the orbit of a mare affected with melanosis, and were inoculated into the conjunctiva and lachrymal gland of an old horse. These merely caused a black spot on the conjunctiva, which extended very slowly; but about the sixteenth week after inoculation, melanosis of the lachrymal gland was very decided; it had invaded the whole organ, and pushed the globe of the eye forward. Some of the melanotic matter, taken from the same mare, was injected into the veins of the neck of a dog, who died suddenly whilst hunting, three weeks after the operation. There was found in the left lung a melanotic tumor, which was ruptured, and which contained a brown, coffee-colored fluid, abounding in cells.

So many instances have occurred of cancer of the penis in men whose wives had cancer of the womb, that many physicians have been led to believe that the disease in these instances was propagated by contagion. (On the disease of the liver by George Budd, M.D., Third Edition, London, 1857, chapter 4., pp. 388-416).

It would in like manner, be foreign to our purpose to enter into any speculation as to the cause of cancer, or into an examination of the question, whether the germ of the disease be a true parasite, introduced from without; or whether cancer is generated within the body, or of the materials of the body, under the influences of certain agencies.

We will have accomplished our purpose in recording these facts, if we succeed in directing the attention of the profession in this country, to the necessity of greater attention to the condition of the subjects selected for the propagation of the vaccine disease.

II. CONTAGIOUS NATURE OF CONSTITUTIONAL SYPHILIS.

We proceed now to the consideration of the second and more important question, which relates to the propagation of one of the most destructive poisons in its action upon the human race.

The formal and persevering denial by eminent surgeons, that secondary syphilitic disease could be communicated by contact, and the adoption of this theory by a large and influential school, has inflicted much domestic misery and led to most unwarrantable and destructive carelessness in the process of vaccination.

The question of the communication, by contact and inoculation of secondary syphilis, is of vast importance in its bearing upon the human race, and should not be settled dogmatically—in fact it is not in any manner a question of belief, but of facts.

As early as 1498, Gaspard Torella affirmed that he had often seen the unweaned child infected by the sore breasts of its mother, and then bestow upon its nurse, who fondled and kissed it, the same unfortunate endowments.

Many of the older writers appear to have entertained no doubt with reference to the possibility of communicating constitutional syphilis. The following testimony is from William Clowes, who wrote more than two centuries and a half ago:

> I have also knowne divers persons infected, who have had in all other parts of the bodie manifest signes thereof, as dolors, tumors, ulcers, and venemous pustules, etc. And yet in the parts aforesaid, no paine, or any signes thereof; so that their opinion is not to be observed, which affirme, that this disease is ingendred onely, by the company of uncleane persons; for I have knowne not many years past, three good and honest midwives infected with this disease, called *Lues Venerea*, by bringing abed three infected women, of three infected children, which infection was chiefly fixed upon the midwives, fingers and hands, etc. What should I speake of young sucking children, whereof divers have been grievously vexed with this disease, and some of them a moneth, two, three or foure moneths old, and some of them a year old, some foure or five yeares old, and some of them sixe or seaven yeares old, amongst which sort, I thought it good here to note a certaine wench, the daughter of one *Sare* of twelve yeares of age, the which I cured, in the yeare oure Lord 1567, who was greatly infected with this sicknesse in many parts of her body, having thereon painfull nodes or hard swellings and ulcers, with corruption of the bones, and yet no signe in the most suspected parts, neither by reason of debilitie was able to have committed any such act, but it is not to be doubted, but that she received the infection, either from the parents, the which cure of some is supposed uncertaine, whether children bagotten by infected parent may bee cured or not; or else she was infected, as children begotten by infected parents, may bee cured or not, or else she was infected, as divers are, by sucking the corrupt milke of some infected nurse, of whom I have cured many, for such milke is engendred of infected bloud, and I may not here in conscience overpasse, to forwarne the good Reader, of such lewde and filthie nurses; for that in the yeare 1583, it chanced that three young children, all borne in this citie of London, all of one parish, or very neere together, and being of honest parentage, were put to nurse, the one in the countrie, and the other two were nursed in the citie of London; but within lesse than halfe a yeare, they were all three brought home to their parents and friends, grievously infected with this great and odious disease, by their wicked and filthy nurses; Then their parents seeing them thus miserably spoiled and consumed by extreme paines, and great breaking out upon their bodies, and being so young, sick and weake, unpossible to be weaned, were forced, as nature doth binde, to seeke by all meanes possible to preserve these poore silly infants, which else had died most pitifully. To be briefe, ere ever those children could be cured, they had infected five sundry good and honest nurses; I cured one of the children, and the nurse which gave it sucke, the other two children and their nurses were also cured by others, but one of the children lived not long after, as I was given to understand. Also, friendly reader, I read of late in a certaine history, written by *Ambrose Pare*, in his 2. book, intreating of the causes of *Lues Venerea* which history indeed is worthy the rehearsall: "An honest citizen saith he, granted his most chaste wife, that she should nurse the childe which she was lately delivered of, if she would keepe a nurse to be partaker of the travell and pains; the nurse that she tooke by chance, was infected with *Lues Venerea*, therefore she did presently infect the foster childe, and he the mother, and she the husband, and he two children which he had daily at his table and bed, not knowing of that poison which he did nourish in his own body and

intrals. But when the mother considered and perceived, that her childe did not prosper or profit by the nourishment, but continually cried and wexed wayward, desired me to tell her the cause of that disease, neither was it any hard matter to doe, for his body was full of the small-pocks, whelkes, and venerous pustules: and the brests of the nurses and mother being looked on, were eroded with virulent ulcers; and the body of the father and his two sonnes, the one about three yeares, and the other foure yeares of age, were infected with the like pustules and swellings that the childe had; therefore I shewed them that they were infected with the *Lues Verenea,* whose beginnings, and as it were provocations, were spred abroad by the nurse that was hired, by her maligne infection. I cured them all, and by the helpe of God, brought them to health, except the sucking childe, which died in the cure; and the nurse being called before the magistrates, was punished in prison and whipped closely, and had been publikely whipped through all the streets of the citie, if it had not been for the honors of that unfortunate family." Thus we see children infected by filthy nurses, and sometimes nurses be infected by giving sucke to such infected children. And now to returne to my former purpose, the disease, as saith *Nicholas Masa,* whose councell and direction in the cure of this disease I have greatly observed. The disease because it hath a flowing matter, being once entered into any part of the body, proceedeth on from part to part, never resting until it hath corrupted the liver, with the ill disposition of this infection especially. When it toucheth any such part, as hath in it an apt disposition to admit such infection, as when the action or force of the agent is wrought and imprinted in the patient, fitly affected to receive the same forme, and so it disperseth itselfe through the whole bodie: likewise this sicknesse is many times bred in the mouth, by eating and drinking with infected persons, and sometimes onely by breathings; and *Almanor* a learned physition setteth downe for truth, that this disease may be taken by kissing, and sometimes by lying in the bed with them, or by lying in the sheets after them; also it is said to come by sitting on the same stoole of easement, where some infected person frequenteth, and sometimes such as have been cured of this disease, fall into it againe by wearing their old infected apparell: all which causes of this disease I rather set downe, for that I would thereby admonish as many, as shall read this treatise. to be carefull of themselves in this behalfe, and to shun as much as may be, all such as may be, all such occasions.—A Profitable and Necessarie Booke of Observations for all those that are burned with the flame of gun-powder, etc, By William Clowes, London; M. Dawson, 1637. pp. 151-2-3.

Gideon Harvey, in his "Venus Unmasked," published two hundred years ago, expresses similar views:

4. *Probl.* How many various ways the pox exert its contagion? No external part is impowered to transmit its infection immediately, except where it's suscepted; so we observe the venereal parts to be infectory immediately upon the susception of virulency, but not through kissing, sucking of the breast, by sweat, or through any other parts but themselves. So the mouth that's infected by kissing, or sucking a thorow pockified whore's tet, is capable of immediately infecting another's lips by kissing, or any other part by sucking it, because the pocky miasms are neer; but not by copulation, or sweat, etc., because the contagion cannot be crept so far. Experience verifies this dictate, Is it not an ordinary trick of wenchers (as *Musa* relates) to suck whore's tongues, and tets of their breast and yet those whom they know have been pockified many years about their lower parts, and for that reason though their appetites are furious, yet dare not be dabbling, but the other they reiterate a thousand times over without the least hazzard? An instance for the other part of the dictate, which I had from my first master in physick, that wonder of physicians, Prof. *Joh. Antonid, vander Linden, p. m.,* the profoundest commentator on *Hippocrates* and *Celsus* that ever any age presented, whom I heard that most famous *Professor Regius Guido Patin* intitulate the *Dutch Hippocrates.* He during his luculent practice at *Amsterdam,* had a merchant's prentice in cure of an genorrhe, and a blistered, or cankered like mouth; both symptoms he confest to have started upon him at the same time. The excellent Professor being curious and admiring at the rarity of such distant symptoms emerging at once, extorted an ingenuous confession from his patient, upon pretence that it would facilitate and abreviate the cure: the other without any longer suspense impudently told him his tongue was as unfortunate as his tayl; a sort of diabolick satyrism, outvying *Aretius flagello de Principi* and very like a *Dutch* invention. What insued? this bastard at a *Besoeck* (an invitation that's usually made to young folks, preliminary to all weddings) accosted himself to two pretty damsels, and being planted between them, oft flanckt to the right, and in a kiss pledged his right hand man, and so to the left, and performed the like duty there. But the tragick event may imprint a dread upon all young women. A short time after their lips felt hot, inflamed, grew sore and ulcered, one named it the thrush, another a sore mouth; vulgar applications rather promoted than checkt the evil, wherein they persisted so long that accessory accidents, as sordid ulcers of the palat and tonsils, nocturnal pains, etc., moved a jealousie of the fowl disease. Here you may remark, how innocently the poor lasses pessundated their fortunes. The reflexion of this relation upon the latter part of the dictate I commit to your own thoughts.

> 2. A wench or monsieur by that time they are thorow pockified, are infectious in any part where ever the pox bursts out, because the virulent seminaries are propagated quite through the body, which exhaling at the places affected, transport the contagion. What the *thorow-pox* is expect below; so that when the malady is tumefyed to so high a flood, its time for nurses, physicians, and all visitors to stand off; upon such occasions a person may be infected by drinking out of the same vessel (provided the spittle adhering be warm still), as we have heard of many; (*Leonardus Botallus* adduceth an observation of a patient of his, of a chast and religious converse, who was stigmatized by a peculiar pledging of his familiar, then under a sore affliction of *thorow-pox*. His lips inflamed, afterwards ulcered, his jaw bone grew carious, and was miserably rackt with nocturnal arthritick, pains). By trying of a warm pocky glove; by succeeding a virulent patient on a close stool; by shifting of him, or making his bed whilst the sheets continue warm; as *Nicol. Massa's* friend and patient, who incurred this evil, by touching the sheets, one lay in, that was lame of a *Neapolitan* ulcer in his legg; and that old woman in *Horst's observ.* aged fifty-six, tending a pocky fellow in his lying in, was seized of the same disease in as furious a degree as her master: and by kissing, witness *Faventinus*, who knew a young man, that contracted this evil by oft kissing a fowl slut. The initial symptoms appeared about his mouth; his privities, which otherwise might have bin suspected, appearing free from all contagion. To this I'l parallel another; one Mrs. &c., then a pocky inhabitant of the *Hague*, having run the gantlop of several cures, hydrotick and mercurial, at last proved with child; her reckoning being expired, she was brought to bed of a monster, in all particulars resembling a living child; saving the skin, which was abominally ciphered with spots and botches. This object of *mercy upon us* was committed to the care of a nurse, the infant aspiring to higher things, had bade world adieu. But the unhappy nurse had cause to curse her late foster child, her breasts and head ulcered, a *caries* got into the *cranium*, the pox took possession of the poor woman's carcase, for want of a purse to release her. The pocky original Mistris, &c., was proclaimed barbarous by a whole jury of matrons, for refusing relief to the disastered woman. In all these transactions the *Pater Familias* stood it out vigorously with a fresh countenance, no sign contradicting his pancratick health. Just such another mischance *Musa Brasarous* tells us, befell a nurse that suckled one Sr. *Orobo's* child, thorowly conspurcated with the pox. The observation hereupon infers this a *thorow-pox*, and consequently must prove infectious in all parts of the body. Physicans in this case run a great risk in feeling pulses and approaching such patients in their sweats.—Venus Unmasked, or a More Exact Discovery of the Venereal Evil, or French Disease: By Gideon Harvey, London; T. Grismond, 1665, pp. 94-5-6-7-8-9.

In like manner Daniel Turner in his work on syphilis, published in 1717, maintains the contagious nature of constitutional syphilis:

> And this I intend shall suffice for its *chronology* or time, the *topology* or place, and the *histriography* or account of the disease in general; which, with some other writers thereon, we shall now define, *a venomous or contagious distemper, for the most contracted by impure coition, at least some connect of the genitels of both sexes, or some other lewed and filthy dalliance between each other that way tending.*
>
> I said *for the most part*, because it is beyond controversy, the infection is communicated by other ways, as from pocky parents by inheritance; by sucking an infected nurse, to the child; suckling a diseased child, to the nurse; lying also in bed with the diseased, without any carnal familiarity; by which, though it may be possible for strong and vigorous bodies to escape, yet are the tender ones, especially of little infants, very likely to be contaminated, as I have more reason to believe than by bare imagination.
>
> There are several other more uncommon ways of giving as well as receiving the *venereal* venom; some of which I have already imparted to the world in short remarks upon a quack libel, printed several years past. But the thought of such vile monsters, and their execrable practices, is too shocking (unless to the dregs of human nature) to bear a repetition of circumstances, and fit only for a detestable *gonologium* or collection of smutt and obscenity, in which I am told, they have been inserted, as some of the author's own observations.
>
> As for those fancied ways of catching it by common conversation, drinking after one, sitting on the same close-stool, drawing on a glove, wiping on the napkin or towel, after the infected person, with a hundred the like stories, I believe in our time (whatever may have happened formerly) there is no great danger. Yet we find in one of our late chronicles, that these and such like imaginations were so strongly riveted in men's minds at that time, even those of the better and more learned sort, that it was one of the articles against a noted cardinal that he had breathed on the king, when he, the said cardinal, had this disease upon him, which you will find in Baker's Chronicle, and of which passage Dr. Harvey has also taken notice.
>
> *Hildanus* likewise tells us of a young gentlewoman, who contracted the same, by only putting on the apparel of a gentleman (that it seems was pox'd) at a masquerade, of which, through modesty concealing her illness (which first of all had seized the *Pudenda*)

> till she was past recovery, she deceased. The good man's credulity, at least his charity, might however be abus'd in this relation, as the young lady perhaps was also after the masque, otherwise than by simply putting on the habit. But were it so as the case is stated, there is nothing therein much more admirable than what the same great man recites of a whole family he knew infected, viz: the wife with three children and a fourth in the womb, as also a maid servant, by the husband, who had got the distemper in their absence only by sleeping in the same bed with his man servant, whom he after under stood was broke out with this distemper.
>
> The relation of *Horst* and *Hornung* are yet more strange, of several people infected in the bagnio, by having the same scarificator apply'd after cupping, as had been used to a *venereal* patient, which seems alike credible with that of the priest poxed at his ear, in the time of confessing a wanton nun; the venomous breath from her mouth defiling the holy father. But enough of this.—Syphilis; A Prartical Dissertation on the Venereal Diseases By Daniel Turner, London : R. Bonwicke & Co., 1717, pp. 10, 11, 12.

John Hunter, in his "Treatise on the Venereal Disease," gives a number of instances of the communication of secondary syphilis, from which we select the following:

> A lady was delivered of a child on the thirtieth of September, 1776. The infant being weakly, and the quantity of milk in the mother's breasts abundant, it was judged proper to procure the child of a person in the neighborhood to assist in keeping the breasts in a proper state. It is worthy of remark that the lady kept her own child to the right breast, the stranger to the left. In about six weeks the nipple of the left breast began to inflame, and the glands of the axilla to swell. A few days after several small ulcers were formed about the nipple, which, spreading rapidly, soon communicated and became one ulcer, and at last the whole nipple was destroyed. The tumor in the axilla subsided, and the ulcer in the breast healed in about three months from its first appearance. On inquiry, about this time, the child of the stranger was found to be short-breathed, had the thrush, and died tabid, with many sores on different parts of the body. The patient now complained of shooting pains in different parts of the body, which were succeeded by an eruption on the arms, legs and thigh, many of which became ulcers.
>
> She was now put under a mercurial course, with a decoction of sarsaparilla. Mercury was tried in a variety of forms: in solution, in pills internally, and externally in the form of ointment. It could not be continued above a few days at a time, as it always brought on fever or purging, with extreme pain in the bowels. In this state she remained till March 16, 1779, when she was delivered of another child in a diseased state. The child was committed to the care of a wet nurse, and lived about nine weeks; the cuticle peeling off in various parts, and a scabby eruption covering the whole body. The child died.
>
> Soon after the death of the child, the nurse complained of headache and sore throat, together with ulceration of the breasts. Various remedies were given to her, but she determined to go into a public hospital, where she was salivated, and after some months she was discharged, but not cured of the disease. The bones of the nose and palate exfoliated, and in a few months she also died tabid.
>
> Of the various remedies tried by the lady herself, none succeeded so well as sea-bathing. About the end of May she began a course of the Lisbon diet-drink, and continued it with regularity about a month, dressing the sores with laudanum, by which treatment the sores healed up; and in September she was delivered of another child, free from external marks of disease, but very sickly, and it died in the course of the month.
>
> About twelve months after the sores broke out again, and, although mercurial dressings and internal medicines were given, remained for a twelve-month, when they began again to heal up. * * * * *
>
> The third case was of a gentleman, where the transplanted tooth remained, without giving the least disturbance, for about a month, when the edge of the gum began to ulcerate, and the ulceration went on until the tooth dropped out, Some time after spots appeared almost everywhere on the skin; they had not the truly venereal appearance, but were redder or more transparent, and more circumscribed. He also had a tendency to a hectic fever, such as restlessness, want of sleep, loss of appetite and headache. After trying several things, and not finding relief, he was put under a course of mercury, and all disease disappeared according to the common course of the cure of the venereal disease, and we thought him well; but some time after the same appearances returned, with the addition of swelling in the bones of the metacarpus. He was now put under another course of mercury, more severe than the former, and in the usual time all the symptoms again disappeared. Several months after the same eruption came out again, but in not so great a degree as before, and without any other attendant symptoms. He a third time took mercury, but it was only ten grains of corrosive sublimate in the whole, and he got quite well, The time between his first taking mercury and his being cured was a space of three years.—The Works of John Hunter, with Notes, edited by James F. Palmer. Vol. 2, pp. 475, 476, 484.

In an extract from a letter to Dr. Duncan, published in the "Medical Commentaries for the years 1783-84-85," it is said that a new disease has lately been discovered in London, occasioned by the transplanting of teeth from the head of one person to that of another. The mortality from it is computed at nearly two deaths to ten diseases; and about one in every hundred who receive teeth by transplantation are affected with the disease. Ulcerations of the throat and gums, and eruptions on the skin, are the chief marks of the disease. When death takes place it is from the occurrence of sphacelus. For five or six weeks after transplanting, the teeth look well, and are as firm as the others. Pp. 490-491.

In the third volume of the London Medical Transactions, Dr. William Watson, Vice President of the Royal Society, recorded an interesting case, illustrating the terrible effects of transplanting teeth, from which we extract the following particulars:

An unmarried lady, in the twenty-first year of her age, of a delicate habit, but in other respects in perfect health, observing one of the incisors of her upper jaw to become black and carious, determined on having it replaced by a sound tooth. This was accordingly done by an able dentist; the tooth which was introduced being taken from the mouth of a person apparently healthy in every particular. At the end of a month, her mouth, which had continued all that time a little tender, became very painful. Her upper gums were at first inflamed and enlarged; afterwards they were discolored and ulcerated. This ulceration spread very fast, insomuch that the gums of the upper jaw were corroded away, and the alveoli left bare. Before another month was at an end, the ulceration occupied the whole space under the upper lip between the teeth and nose; it extended likewise to the cheeks and throat, which were corroded by large, deep and fetid ulcers. Soon after this, part of the alveoli of the upper jaw became carious. one of her teeth dropped out; and in a few days a second tooth, together with the transplanted tooth, which hitherto had remained firm in its place. About this time blotches appeared on her face, neck and various parts of her body; and several of these became ulcerated sores. The fetid discharges from her mouth and throat had for a considerable time deprived her of sleep; and the soreness of the parts had prevented her from taking nourishment. And, in addition to these, the soreness from the external ulcers induced such a degree of fever that her death was soon expected.

When Dr. Watson was consulted, concluding that all her fluids were in a most putrid and acrimonious state, he directed peruvian bark combined with gum-myrrh in large doses. No benefit resulted trom this plan, and the patient was placed upon alterative doses of mercury. The improvement was marked, the ulceration was arrested and the blotches began to disappear. The internal administration of mercury was abandoned, on account of its irritant effect upon the bowels, and the impression was kept up by rubbing mercurial ointment into her legs and thighs; this practice in like manner was attended with beneficial effects. In about ten or twelve days, the blotches had entirely disappeared and the ulcers of the mouth almost completely healed. The griping and purging, however, returned with such violence that Dr. Watson was compelled to abandon the mercury altogether. Small portions of the carious alveoli continued to exfoliate, the ulceration began again to spread, the patient labored under great weakness, with frequent returns of feverish heat, and was every night oppressed with colliquative sweats. Her strength gradually lessened, till death put an end to her sufferings.

As the progress of the disease was not impeded by the most powerful antiseptics in liberal doses, and as it gave way to mercurials even in small doses, there appeared to be good ground for believing that the taint was truly venereal; but Dr. Watson, although aware of the great subtility ot the venereal poison, was perplexed by the statement that the person from whom the tooth was taken was perfectly well, and never had any venereal taint.

Mr. Clement Hamerton, Surgeon to the Castletown Dispensary, has recorded in the Dublin Journal (March, 1841) cases illustrating the introduction of syphilis into the system, through other channels than sexual intercourse, from which he draws the following conclusions:

A healthy child is applied to the breast of a venereal nurse; in a couple of weeks syphilis shows itself in the child. A venereal child is applied to the breast of a healthy woman; soon afterwards she gets a syphilitic sore of the breast, which contaminates her system. A servant girl sucks a venereal sore breast, she gets a venereal ulcer of the mouth, which taints her system. The midwife has a slight scratch on the palm of the hand, and in delivering a putrid venereal child, she gets a sore on the hand which infects her system; and lastly the husband of the widwife is diseased at the time the ulcer exists upon his wife's hand.

Dr. Egan has recorded (Dublin Quarterly Journal, May, 1846) several cases illustrating the contagiousness ot secondary syphilis. In the first case the child was born apparently healthy; eight weeks afterward syphilis appeared. An ulcer then presented itself upon the breast of the nurse, and secondary syphilis occurred. In the second case the child was born apparently healthy; about ten weeks afterward a suspicious rash appeared, succeeded by blisters and fissures about the mouth; ulcers occurred on the nurse's breasts, and then a scaly eruption and other secondary symptoms. Both cases were cured by anti-syphilitics. In the third case the woman was a dry nurse, being disqualified by age from suckling. The child was unhealthy, and affected with sores, of a brownish color, about the nates and mouth, and a constant flow of saliva. A scratch appeared on the neck of the nurse, whether produced by a pin or torn by the nails of the child was uncertain; but being in the habit of bringing the child's mouth in contact with the affected part, in order to induce sleep, the disease was believed to be communicated through the abrasion, and the local effect was succeeded by an eruption, cured by anti-syphilitics.

In a trial which took place at Cork, Dr. O'Connor and Dr. Bull gave evidence to show that a child affected with syphilitic eruption may convey the contagion to the nurse. (Lancet, July 4, 1846.)

Dr. Hector Gavin has given the history of a case where a man and his wife, purporting never to have had syphilis, had a first child born perfectly free from any traces of the disease, subsequently to which the diseased child of a woman known to have had syphilis, but *supposed* to be cured, was placed to the wife's breast, the nipple being "cracked" at the time, and the disease was communicated. (Lancet, July 18, 1846—Rankin's Abstract.)

Mr. Price, of Margate, has recorded the case of a woman who had syphilis, which commenced in the nipple, from nursing an infected child. She gave birth to one child affected with the disease, and to another dead child. The child from whom this woman derived the disease had a very sore mouth and smelt very badly, and its father was known to have secondary syphilis of an aggravated character. Another respectable married woman, six weeks afterwards, applied to Mr. Price, having syphilis, with a large sore on one of the nipples, and it turned out that this woman was nursing the same child which had affected the former nurse. This woman's own child also had the disease. This woman affected her husband. Two years and five months subsequently she gave birth to another child; this was affected with syphilis; twelve months subsequently another child was born similarly affected, and after this the mother was cured with iodide of potassium. Several very remarkable cases by Lallemand, Dr. King and Dr. Maenick, will also be found in the twelfth volume of the Medical Times—pp. 81, 176, 422—Rankin's Abstract, v. 10, p. 336.

According to M. Rizzi, who had an ample field for recording facts relating to congenital syphilis, in a large hospital under his charge in the city of Milan, if a woman contracts specific ulcerations on the breast by suckling an infected infant, mucous tubucles very frequently develop themselves on the vulva and about the anus; and the syphilis, although secondary, is transmissible by contact, so that a perfectly innocent woman may communicate the disease to her husband; and it behooves the medical attendant to be well apprised of this fact, as upon his knowledge of it not only the health, but the peace of mind and honor of the individuals must rest.

Of one hundred individuals with chancres on the breast from impure lactation, or on the mouth or throat, derived from contact with an infected infant, thirty-four have tubercles of the vulva, nineteen syphilitic angina, three iritis, fourteen tubercles of the vulva and angina simultaneously, five tubercles of the vulva, and others disseminated over other parts of the body of divers complicated symptoms, six tubercles of the vulva, angina, tubercles on the skin and iritis, and nineteen no secondary symptoms.

In nurses, as well as in men infected with them, M. Rizzi has remarked that tubercles are the most common form of secondary symptoms, and angina is frequently superadded. A discharge, vegetations, and exostoses, are very rare, and buboes, when they occur, consist only of swelling and tension of the sub-maxillary or axillary glands.

In fifty-three infants, the disease manifested itself one month after birth in thirty-three; at the expiration of two months in eleven; of three months in four; and in one only after the expiration of eight months. These statistics show how easily parties may be deceived as to the condition of infants that have been subject to the syphilitic poison, from infants taken by them to nurse, without the slightest apprehension, whose parents even might not have a suspicion of the existence of the disease.—Rankin's Abstract, vol. v. p. 219, from Gaz. Med. di Milano, and Gaz. Med. de Paris, Oct. 25, 1846).

On the twenty-fifth of October, 1858, a letter was addressed to the Imperial Academy of Medicine at Paris, by the Minister of Commerce, Agriculture and Public Works, requesting an authoritative answer upon two question; first, whether constitutirnal syphilis was contagious; and secondly, whether, as regards contagion, there was a difference between constitutional syphilis as seen in infants at the breast and in adults. This letter led to the appointment of a commission consisting of MM. Velpeau, Ricord. Devergie, Depaul, and Gilbert, and these commissioners reported and their report was adopted by the Academy,—first, that some of the manifestations of secondary syphilis, especially condylomata, are undoubtedly contagious; and secondly, that there is no reason to suppose that the case is different in infants at the breast and in adults.

The commissioners arrived at this conclusion after examining the clinical facts and experimental researches already on record, and after four experiments of their own, which was taken with great reluctance on their part. The persons experimented upon were all suffering from lupus, but free from any syphilitic taint, and these were chosen from the notion that the treatment for syphilis, if the inoculation took effect, might possibly be of service in remedying the lupus.

The following case will serve as an example of the four experiments:

On a man whose face had been affected with lupus from childhood, a raw surface was made on the left arm by strong ammonia, and to this was applied a piece of lint soaked in purulent matter obtained from a condyloma near the anus of a person who had had a chancre fifteen months previously. The condyloma was of fifteen days standing. Fourteen days afterwards there was slight redness at the seat of inoculation. Four days later still, a prominent coppery-colored papule made its appearance in the same part. On the twenty-second day this papule was much larger, and there was a slight oozing from the surface. During the week following, the oozing, after being purulent, dried up into a thin scab. On the twenty-ninth day a gland in the corresponding axilla became enlarged. On the fifty-fifth day, the papule on the arm had become a real tubercle, with some slight ulceration in the centre, and several blotches and coppery papules had made their appearance on the trunk. During the week following, these papules became multiplied on the body, and they spread also to the extremities; many of them also changed into pustles of acne. Two or three days later the patient was put under the treatment for syphilis, and in six weeks, at the date of the report, there was still much to be done in the way of a cure.

In addition to asserting the contagiousness of secondary syphilis, the commission arrived at the conclusion that there are characteristic grounds of distinction between the primary and secondary affection, and that the period of incubation in the secondary affection is from eighteen to twenty days, or even longer; and that the result is first a papule, and then a tubercle, which is finally converted into an ulcer covered with a crust.—Rankin's Abstract, No. 30, p. 272, from Comptes Rendus, May 24 and 31, 1849.

We might greatly multiply such facts from various authors, but this appears to be unnecessary, as the experience of the authors just quoted covers three centuries; and we are justified in affirming that it is now clearly established that constitutional syphilis can be transmitted by direct inoculation with the secretions of secondary sores.

And recent experiments have shown that the blood of persons affected with constitutional syphilis is capable when inoculated on healthy subjects of giving rise to syphilitic disease.

Waller succeeded in inoculating a healthy boy fifteen years old, with this disease, by applying the blood of an individual affected with secondary syphilis to incisions made by a scarificator on the body of the boy. Well marked and unmistakable symptoms of secondary syphilis followed this experiment.

In Gibert's case, the blood was taken from a large squamous papule on the forehead. "The point of the lancet was thrust into the *circumference* of the papule, and charged with a blood *which was somewhat serous.*" It may be objected that the blood in this experiment was mixed with some of the diseased secretions within the papule itself.

The secretary of the Society of Medicine of the Palatinate communicated the general results of the inoculations performed by an individual. "Of those men inoculated with the same blood, three were successful, and there were cases where a large absorbing surface had been rubbed."—Archives Générale, secs. 10, 11, p. 603.

Whatever objections may have been urged to these experiments, no fault can be found with the well-conducted experiments performed by Prof. Pelizzari,* of Italy, in 1862.

As this subject is of great interest, we present the account of these experiments:

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*Lectures on Syphilis, by Henry Lee, 1863; p. 198.

> This physician inoculated two medical students with the blood of a syphilitic patient with a negative result. On the sixth of February, 1862, he resumed his experiments, three physicians, Drs. Bargioni, Rosi, and Passagli submitting themselves to his investigations. The blood of a female patient, aged twenty-five, affected with constitutional syphilis, and who had undergone no treatment, was used for the purpose. The blood was drawn, with a new lancet, from the cephalic vein. The patient was at the time affected with mucous papules on the left labium, at the place where the chancre had existed; mucous tubercles surrounded the anus, and the inguinal glands were indurated and enlarged, and there were pustules on the head. At the point on the arm from which the blood was drawn there was no sign of any eruption, the skin of the part was well washed, and the surgeon washed his own hands. The bandage was new, as was also the vessel in which the blood was received. As the blood escaped from the cephalic vein, some of it was received on a piece of lint, which was placed on the upper part of Dr. Bargioni's arm, where the epidermis had previously been removed, and three tranverse incisions made. A similar operation was performed on the other two gentlemen, but in the case of one the blood was cold, and in that of the other it had coagulated.
>
> After twenty-four hours the dressings were removed, and nothing was observed but the crusts formed by the effused blood. Four days afterwards all traces of the inoculations had disappeared.
>
> On the morning of the third of March, Dr. Bargioni informed Prof. Pelizzari that in the center of the inoculated surface he had noticed a slight elevation, which produced a little itching. The arm was examined, and at the point indicated Prof. Pelizzari found a small papule of a roundish form, and of a dull-red color. On the eighth day the papule had augmented to the size of a twenty-centime piece. On the eleventh day it was covered with a very thin adherent scale, which became denser, and on the second day commenced to crack in its central part. On the fourteenth day two axillary glands became enlarged to the size of nuts. The papule remained indolent, and there was no induration at its base. On the twenty-first, the scale was transferred into a true crust, and the part beneath was ulcerating. Slight induration was more evident. On the twenty-second the crust was detached, leaving a funnel-shaped ulcer, with elastic and resistant borders, forming an annular induration. There was but a small amount of secretion from the sore, and the pain was trifling. On the twenty-sixth the ulcer had become as large as a fifty-centime piece, and the surrounding induration was considerably increased. Up to the fourth of April the ulcer remained stationary, but at that date its base appeared to be granulating. The axillary glands remained swollen, hard, and indolent. Slight noctural pains occurred in the head about this time, and the posterior cervical glands became somewhat enlarged. On the twelfth of April spots of an irregular form and of rose color appeared on the surface of the body. The eruption extended itself, and during the succeeding days became more confluent. No constitutional disturbance, heat of skin, or pruritus accompanied it. On the twentieth the cervical glands had increased in size and were harder. The chancre mantained its specific character and exhibited no tendency to cicatrization. On the twenty-second the color of the eruption was decidedly coppery. Small lenticular papules were now perceived to be mixed with the erythema. The edges of the chancre had begun to granulate. Mercury was now administered.
>
> This case is of itself sufficient to prove the inoculability of syphilis through the blood of an infected person.

No objection can be urged against this inoculation, that any precaution against a fallacious result had been neglected.

The following may be accepted as the generally received doctrines with reference to the inoculation of syphilis:

1. There are two kinds of primary venereal sores, namely: The *simple contagious ulcers of the genitals*; the "*soft*" or "*chancroid*" ulcer; and the *true chancre*—the "indurated" or "Hunterian" chancre.

The soft or chancroid ulcer is a purely local disease, accompanied by *suppurating* enlargement of the lymphatic glands of the region in anatomical relation to the seat of the sore; it is *non-infecting*, the general constitution not being affected or infected by the virus which produces it.

The poison of soft chancre can be transferred or transplanted by contagion, or by inoculation from one part of the body to another, and thus the person who is the subject of it may come to exhibit second sores of a similar character on more parts than one; it is, therefore, said to be *auto-inoculable*. The general system not being infected, an attack of the primary disease is not succeeded at any future time by general symptoms; and the primary attack affords no immunity against a future contagion.

The following case will serve as an example of the four experiments:

On a man whose face had been affected with lupus from childhood, a raw surface was made on the left arm by strong ammonia, and to this was applied a piece of lint soaked in purulent matter obtained from a condyloma near the anus of a person who had had a chancre fifteen months previously. The condyloma was of fifteen days standing. Fourteen days afterwards there was slight redness at the seat of inoculation. Four days later still, a prominent coppery-colored papule made its appearance in the same part. On the twenty-second day this papule was much larger, and there was a slight oozing from the surface. During the week following, the oozing, after being purulent, dried up into a thin scab. On the twenty-ninth day a gland in the corresponding axilla became enlarged. On the fifty-fifth day, the papule on the arm had become a real tubercle, with some slight ulceration in the centre, and several blotches and coppery papules had made their appearance on the trunk. During the week following, these papules became multiplied on the body, and they spread also to the extremities; many of them also changed into pustles of acne. Two or three days later the patient was put under the treatment for syphilis, and in six weeks, at the date of the report, there was still much to be done in the way of a cure.

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*Lectures on Syphilis, by He

The true indurated or Hunterian chancre, although at first apparently a local disease, does not remain long a purely *local disease;* it is accompanied by indolent, *non-suppurating* multiple enlargements of the related lymphatic glands, and its virus infects or contaminates the whole system, which is thus protected against a second miasm of the primary disease. The general infection of the system exhibits itself in various ways, or by certain general symptoms, called *secondary, or tertiary, or constitutional syphilis.*

It does not follow necessarily that the two forms of venereal ulcer are due to two specifically different kinds of virus.

Thus some surgeons of eminence hold with Dr. Boeck, of Christiana, that the soft chancre is produced by the same virus as the indurated chancre; the two forms arise from the *intensity* of their virus being different. Soft chancres are held to be the product of the most energetic virus, which by its intensity develops in its circumference an inflammation which puts an obstacle in the way of absorption; indurated chancres are the product of a virus of less intensity, which does not develop an inflammation sufficiently strong to impede absorption. When the matter is very intense we get a definite soft chancre; if it is of little intensity we get a definite indurated chancre. It is with matter of an intensity different from these that we obtain intermediate forms of chancre, to which, with all our experience, we are uncertain whether or not the primary affection will be succeeded by constitutional syphilis.

Syphilis, in its manifestations as a general or constitutional disease, has a period of incubation, short sometimes, but at other times prolonged. Constitutional symptoms rarely occur before the third week following the appearance of the primary symptoms, and more rarely still after the sixth month. The interval is one marked by no characteristic disturbance of the general health. The infection may not manifest itself until some disturbance of the constitution is brought about. For instance, Bamburger, of Wurzburg, mentions two cases where secondary manifestations did not appear until the occurrence of small-pox. In like manner, vaccination may cause such a disturbance in the system infected with the syphilitic poison, as to excite the manifestation of secondary or constitutional symptoms.

2. Constitutional syphilis is transmissible to offspring; it is an *hereditary disease,* and like the constitutional malady in the parent, it exhibits its manifestations generally in their system. The symptoms of hereditary or congenital syphilis are secondary and constitutional symptoms. Hereditary syphilis exhibits itself in the offspring of syphilitic parents, not in the primary form of a chancre, but in some of its secondary constitutional forms.

3. Syphilis is contagious and inoculable, both in its primary form and in its secondary or constitutional stage; and when it is thus transmitted to the healthy it always appears first in the primary form. Not only can the disease be propagated from the original chancre, and from the syphilitic eruptions, but by inoculations as shown by the experiments of Wallace in 1835, by Vidal in 1849, by Waller in 1850, and by Rincker in 1852. All these observers assert that where the inoculation was performed with the morbid secretions of constitutional syphilis, the result was a *primary lesion,* having all the characters of an infecting chancre. A remarkable character of these inoculations was the *period of incubation of the disease,* which never appeared before the expiration of the second week, but in general not till after the expiration of *the fourth* week.

The interval between the introduction of the virus and the appearance of the local disease, was much longer than when inoculation was practiced from a primary sore. The first alteration was always observed at the spot where the inoculation had been practiced; the disease produced had a *progress essentially chronic*, so much so indeed, that the local affection was still present when the generel symptoms appeared if not subjected to treatment.

The general symptoms only appeared at the end of a month, and often much later, after the first manifestation of the local lesion.

4. Whether syphilis be really derived from a *primary*, or from a *secondary* affection, *the disease which appears upon the recipient is always the primary form of syphilis*, always *a chancre*, or the induration which only requires the most trifling modification to become a sore.

A chancre appears at the place *where the matter of contagion from the secondary lesion has been applied.*

The imparted disease never appears first in the form of a constitutional malady, at the due time secondary symptoms become manifested.

There intervenes an incubation of about three weeks.

This is, then a mark, a test by which we can distinguish between an imparted syphilis and one which is merely aroused from latency in an individual already tainted. In the former case, the first thing observed is a *chancre;* in the latter there occurs no chancre, but the disease appears at once in its *secondary or constitutional* form.

When therefore syphilis occurs after vaccination, first in one of its constitutional manifestations, it is a proof that it was not imparted by contagion, but is the result of an inherent constitutional taint.

5. Syphilis may be communicated by inoculation of the blood of a person, whose constitution is infected with syphilis; and from whatever source, the disease which first results is a chancre, the primary form of syphilis.*

III. COMMUNICATION OF SYPHILIS BY VACCINATION: POST VACCINAL SYPHILIS—VACCINO SYPHILITIC INOCULATION.

III. As we have before said, in the third section of this inquiry, the acceptance without reserve of the doctrine of John Hunter, expressing the impossibility of the coëxistence of two actions, or two local diseases, or two different fevers, in the same part, or in the same constitution, at one and the same time, would necessarily lead to the denial of the possibility of transmitting syphilis, through the medium of the matter produced by a distinct disease as cow-pox.

What are called pathological *laws*, are nothing more than expressions of the fixed modes in which the phenomena of disease are manifested, and they conform to truth, only when they conform to, or formulate, the established course of nature. It is evident that a law may correctly express the relations of a certain class of facts and phenomena, without necessarily embracing other facts and phenomena, which upon a superficial view are related to those undoubtedly embraced by the law.

Whilst the law of Hunter may express the relations of the actions of the special poisons of the exanthemata (and we have shown in the third section, that it was from this very class of diseases, that the law was formulated), it does not at all necessarily follow, that it is applicable to the actions of poisons differing wholly in their nature, mode of origin, and pathological processes.

The poison of syphilis, after its introduction into the system, induces profound alterations in the blood, and in the processes of secretion and nutrition, and, in fact, produces derangement through all the solids and fluids. The economy under the action of constitutional syphilis, is to be looked upon as entirely deranged. When, therefore, another disease is engrafted upon this state, the product of that diseased action must partake, more or less, of the diseased condition of the blood and tissues. Does any one deny this, with reference to the products of inflammation excited in the syphilitic subject? Where is there sufficient proof to show, that syphilitic blood and lymph, furnishing materials for the elaboration of the vaccine matter, loses. altogether during this new process, its contagious and poisonous properties in the vaccine vesicle? Is not the vaccine vesicle but the manifestation of a general disease affecting the entire system, just as the eruptive skin affection of syphilis is the manifestation of a disease pervading the entire system? In addition to the facts recorded in this inquiry, is it not well known that the fetus in ultero is affected by the vaccination of the mother? And it is probable, though experiments are as yet wanting, that the blood of one suffering with the vaccine disease may propagate the disease by inoculation.

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*Ballard on Vaccination, p. [illegible].

If then it be possible to produce a protective vaccine pustule in an individual suffering from secondary syphilis, then it is established that two local and two constitutional diseases may exist at the same time and in the same constitution, and the law of Hunter falls to the ground, as far as the action of these two animal poisons is concerned.

If the law of Hunter be universally applicable, we should have no vaccine disease produced at all, upon individuals suffering with constitutional syphilis.

But even admitting that the special contagious matter of cow-pox, formed from the blood of one suffering with constitutional syphilis, is free from the poison of syphilis, how can we practically, in the process of vaccination, separate this from all admixture with the diseased epithelial cells, cellular tissue, and syphilitic products of the skin and blood. If the dried scab be used, does not this cover, and in fact has it not been formed from a circumscribed portion of structure which had been originally tainted with syphilis, and are not its borders encrusted and mixed up with the products of the secondary diseased skin?

The truth is, that we have much yet to learn about the phenomena manifested by the living organism when acted upon simultaneously by two or more poisons. Much of our established treatment consists in the use of certain poisons, often related to those under which the system is laboring.

In this inquiry we do not need pathological formula and generalizations, so much as well authenticated facts.

We cannot subscribe to the doctrine, that practically all danger may be avoided, by proper caution, as "every morbid appearance on the cutaneous envelope has its own peculiar character, by which it may be distinguished from other similar phenomena, and thus the observer may easily establish a distinction between the vaccine vesicle and other vesicular, bullar, or pustular eruptions." Is it not well known that syphilis may lurk for years in one individual, never occasioning so much inconvenience as to arouse suspicion, until it is unmasked by the unexpected appearance of an infected offspring? On the other hand how fearful and destructive is the progress of the disease in others, in which from the first apperance of the chancre, symptom follows symptom, sore throat, swelled testicle, iritis, eruptions, nodes, ulcerations, and caries, until the entire body has become apparently a mass of filth and rottenness.

We are utterly and profoundly ignorant of the variations of the vaccine vesicle under these different states of the constitution; and we are utterly and profoundly ignorant of those conditions which are essential to the transmission of the syphilitic poison through the medium of the vaccine vesicle.

But to the facts:

About twenty-nine years ago a medical man was condemned to two years imprisonment for having vaccinated several children from a child exhibiting a syphilitic eruption on its face and body. The witnesses asserted that the vaccine pustules had not been properly developed, and were followed by tedious ulcerations. Moreover, nine grown-up persons were asserted to have been re-infected by the children tainted through the vaccine pustule.

The judgment was commuted, in consequence of the opinions expressed by Messrs. Heyfelder and Pauli, two distinguished medical men of Rhenish Bavaria, whose judgment had been supported by that of Ricord and Cullerier, who utterly denied the possibility of communicating the syphilitic poison by the agency of vaccine lymph.—(B. and F. Med. Chirurg. Rev., Oct., 1855, from Bull. Gén. de Thérap, July, 1855).

Dr. Whitehead has made the following statement in the "Third Report of the Clinical Hospital, of Manchester," p. 52:

> "The occasional presence of eruptions on the skin and other forms of disease, as an entailment apparent or actual of vaccination in a family not previously subject to such affections, undoubtedly operates in the minds of many very much to the depreciation of the procedure as a preventive and healthful measure; and certainly in not a few instances there would seem to be just and sufficient reason for such prejudice. But the cause of this is not to be found in the vaccine virus in its pure state; it is due to a morbid material superadded, and its nature peculiar and extraneous. *The noxious matter commonly conveyed by vaccination is the syphilitic poison.* A child of naturally vigorous constitution, whose blood is tainted with the poison of syphilis, may retain the outward appearance of health up to three, six or twelve months, or even two or three years longer before a characteristic outbreak shows itself. The parents of such a child may also have the semblance, to superficial observation, of faultless health, although still possessing the seeds of the malady in a degree sufficient for its transmission to their offspring. *It is from such sources that mischief is often derived and disseminated, by vaccination, and other modes of implication;* and it is true that the efficacy of this great sanitary measure has been *in many instances* rendered questionable."

Dr. Whitehead furnishes a table of sixty-three cases of infantile syphilis, treated in the course of twenty-two months at the Clinical Hospital, of Manchester, and out of these cases he attributes no less than fourteen, or twenty-two per cent., to vaccination.

This proportion appears to be almost incredibly large; and the statement of Dr. Whitehead is singularly at variance with that of such men as Acton, Erasmus, Wilson, Watson, Jenner, Simon, De Merie, Henry, Lee and other distinguished surgeons and physicians.

Another case is recorded by Dr. Whitehead in his work, "On the transmission from parents to offspring of some forms of disease, and the morbid taints and tendencies," 1851, p. 17.

Cerioli, of Lucca, relates two instances illustrating the transmission of syphilis by vaccination. In one forty-six children were vaccinated from an apparently healthy child, and of the entire number only six escaped syphilitic contagion; in the other several children received syphilis at the period of vaccination from a child *apparently healthy*, but whose father was syphilitic, the child herself presenting what were believed to be syphilitic symptoms at a subsequent period.

Similar cases have been recorded by Hübner. Eight children vaccinated from a child apparently healthy, but as subsequent investigation showed contaminated by its mother with syphilis, presented ulcerations at the vaccine punctures and manifested constitutional symptoms. Five other children vaccinated at the same time from the same child escaped.

M. Viennois* has collected many cases of the transmission of syphilis by vaccination, and has summed up his conclusions from the data on hand. From his observations and researches it would appear that syphilis cannot be communicated by vaccine virus taken from a subject affected with the disease unless a portion of the blood of the individual is also inoculated. Thus he says:

"When the vaccine virus of a syphilitic subject, pure and unmixed with blood, is inoculated on a healthy individual, a simple vaccine pustule is obtained, without any near or remote syphilitic complications being produced.

"On the contrary, if, with the vaccine virus of a syphilitic individual who either has or has not at the time constitutional accidents, a healthy person is vaccinated, and the point of the lancet be charged with a little blood at the same time as with the vaccine virus, both diseases may be transmitted by the one operation—the vaccine disease with the vaccine virus, and syphilis with the syphilitic disease."

M. Viennois also concludes that in such cases the vaccine vesicle is developed first, and that after undergoing its incubatory period the syphilitic ulcer, with all the characteristics of a true chancre appears.

The following are the conclusions of M. Viennois.

1. Syphilis has in many instances been observed to follow vaccination, ever since the introduction of that operation, and by authors worthy of credit, French, English, German, Italian, etc.

2. When a syphilitic subject is vaccinated, in whom the disease is in a latent state, syphilitic symptoms may be developed by the vaccine influence; these symptoms often consist in general eruptions of a papular, vesicular character, but a chancre never forms at the seat of the vaccinal puncture.

3. On the contrary, if a healthy subject be vaccinated with vaccine virus taken from a syphilitic subject, 'and the lancet be charged at the same time with a little blood, as well as vaccine matter, the two diseases may be conveyed by the same puncture—the vaccine with the vaccine matter, and syphilis with the syphilitic blood.

4. In these cases, of which a number are on record, vaccination is first developed because its period of incubation is shortest, and its evolution more rapid than that of syphilis. The latter appears subsequently, and manifests itself by its characteristic lesion at the inoculated spot.

5. The initial lesion, then, by which syphilis, following the vaccinal pustule, manifests itself, is an indurated ulcer, with adenitis; in a word, all the phenomena of primitive syphilitic chancre. The great law announced by M. Rollet, that syphilis always commences by a chancre, even when it result sfrom secondary symptoms, or even from syphilitic blood, is thus fully confirmed.

6. After the primary chancre is developed at the inoculated spot, and in the usual period, secondary syphilis occurs, and runs the usual course, as if transmitted in any other way.

7. When the mixture of virus does not take place accidentally, but is affected intentionally, (as practiced by MM. Spèreno and Daumès, by mixing the vaccine matter with the pus of chancre), the result is the same; one virus does not destroy the other, but each runs its separate course.

8. The vaccine matter thus acts as a simple vehicle for the virus contained in the syphilitic blood, which it divides and dilutes, as a drop of water would do, without at all modifying its properties or its effects.

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* De la Transmission de la Syphilis par la Vaccination. Archiv. Gen. de Med., Juin, Juillet, et Septembre, 1860.

9. It is important, then, never to take the vaccine virus from a suspected person, or from an infant whose parents are unknown before the age at which hereditary syphilis usually manifests itself,

10. If circumstances make this last necessary, great care should be taken to collect only the vaccine matter, free from blood or any syphilitic humor.

11. In no case should a healthy subject be vaccinated with matter taken from a syphilitic subject, for in spite of all precautions, there can be no certainty as to the purity of the vaccine matter.

12. These precautions are the more important, because, with the matter from one syphilitic subject a number of persons may be vaccinated, and syphilis conveyed to many (as seen by Ceriale, of Cremona).

13. It is sufficient to point out these precautions, to avoid new evils, and to remove the cavils of the enemies of vaccination; for in these cases, the propagation of syphilis is not the fault of vaccination, but of the vaccinator.—Gaz. Mèd. de Paris, Jan. 26, 1861. American Journal of Medical Sciences, April, 1861.

These views of M. Viennois have received the most ample confirmation from the tragedy which occurred at Rivalta, in Italy, by which forty-six children and twenty nurses had syphilis communicated to them through vaccination, and of which several of the children died. The full details of this remarkable event are given in a memoir by Dr. Pacchiotti,[*] of Turin.

On the twenty-first of May, 1861, Sig. Cagiola vaccinated Giovanni Chiabrera with lymph contained in a tube sent from Acqui. Tht operation was performed in the usual manner and with a perfectly clean lancet. The child was eleven months old, and in good health at the time. Forty-six other children were, ten days subsequently, vaccinated with the lymph taken from the vesicle of this child; and ten days after this, seventeen children were vaccinated with lymph taken from the arm of Lugia Manzone, one of the forty-six first vaccinated.

Of these sixty-three children, forty-six—thirty-nine of the first lot and seven of the last—were within two months attacked with syphilis. On the seventh of October seven of them, including the little Manzone, were dead, three were yet in danger of dying, fourteen were recovering under the use of mercury and iodine, and one was well.

A medical commission was now appointed to inquire into all the circumstances connected with this fatal event, and they proceeded to the execution of the duty assigned them.

Twenty-three children were examined in full; the others were not so accurately noticed, as their parents had neglected to avail themselves of medical aid in time. In the forty-six children who were affected, syphilis appeared at periods varying from ten days to two months after vaccination, the average time being twelve days. The initiatory symptoms were variable. Sometimes just as the vaccine vesicle had healed. it became surrounded with a red, livid, and copper-colored areola, and ulcerated again. In other instances an ulcer would form on the cicatrix, and become covered with a scab, which in a few days would fall off to make room for another, and so on. In others the vaccine vesicles had an unhealthy appearance from the first, and were accompanied by a general eruption.

The principal symptoms observed by the commission were mucous tubercles in the vicinity of the anus and on the genitals, ulcerations of the mucous membrane of the lips and fauces, engorgement of the lymphatic glands in the groin and neck, syphilitic skin diseases, alopecia, deep tubercles, gummy tumors, etc.

In two subsequent papers, Dr. Pacchiotti[*] continues the detail of his investigations. On the eighth of February, twenty of the mothers or nurses of the forty-six children had become affected with symptoms of syphilis. He ascertained, too, from a revaccination of five of the children, that the occurrence of syphilis had not destroyed the efficacy of the first vaccination. But he also discovered the source of the infection. It appeared that a year and a half previously a young unmarried woman had syphilis, and that she was syphilitic at the time Chiabrera was vaccinated. The woman was the mother of a child which had died syphilitic three months after its birth. After the death of the child she was in the habit of having her breasts drawn by the little Chiabrera, and gave him the clothes which her own child had wore. Another child nursed by this woman, but who was not vaccinated, also became syphilitic, and this child infected its mother just as little Chiabrera did his mother. It is therefore shown that the vaccine virus used on Chiabrera was not at fault, but that all the other forty-five children were infected through the lymph taken from his arm. It is also shown that blood was on the lancet when several of the children were vaccinated.

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[*] Sifilide trasmissa per Mezzo della Vaccinazione in Rivalta, presso Acqui. Gazetta della Associazone Med., Octobre 20, 1861.

Dr. Pacchiotti, as the results of his investigations and those of the commission gives the following rules to be observed in vaccinating:—

2. Inquire into the state of the parent's health.
3. Take the lymph in preference from those children who have passed the fourth or fifth month, as hereditary syphilis appears in general before that time.
4. Do not use lymph taken from a vesicle which has passed its eighth day, because on the ninth and tenth days the lymph becomes mixed with pus, which latter may be of an infectious character.
5. In taking the lymph, avoid hemorrhage, as there is less danger with lymph free from blood.
6. Do not vaccinate too many children with the same lymph.

In consequence of the publication of the details of the lamentable affair at Rivalta, Dr. Marone concluded to relate the particulars of a similar event which occurred to him, and in regard to which he had thought it advisable to maintain a discreet silence. The particulars are given with sufficient fullness by Mr. Lee, whose excellent work I have already referred to several times.

It seems that in November, 1856, Dr. Marone obtained some vaccine lymph, with which he vaccinated a number of children at Lupara. The lymph was contained in glass tubes, and Dr Marone noticed that it was mixed with a little blood, which affected its transparency. Of the number of children vaccinated with this lymph, notes were preserved in twenty-three cases. All these were affected with syphilis, and the disease likewise manifested itself among the mothers, nurses, and even the servants who were brought in contact with them. The symptoms with which the children were affected consisted chiefly of a syphilitic character, and subsequently of mucous tubercles at the angles of lips, around the anus, and on the vulva. The post-cervical and inguinal glands were enlarged, and there was emaciation, in degree varying with the severity of the syphilitic symptoms.

Besides these cases, eleven nurses of the number who suckled these children gave the disease to eleven other children who were not vaccinated.

In some of the cases the syphilitic phenomena continued till April, 1859.

Dr. Marone draws the following conclusions from his experience:

"That the syphilitic virus was really transmitted in the above recorded cases by means of vaccination.

"That the children vaccinated suffered first, and became the means of transmitting the disease to others.

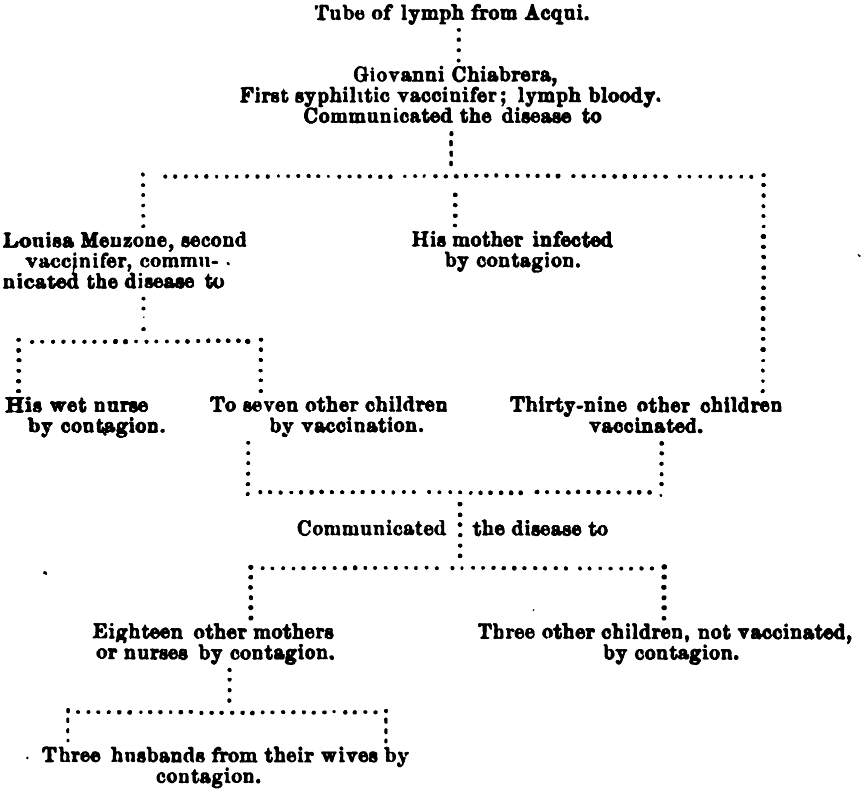
"That the lymph used for the purpose of vaccination was impure, being mixed with blood, and that the result shows how necessary it is to abstain from using lymph of that description."

In the sad tragedy enacted at Rivalta, a child named Chiabrera was vaccinated; from him another child named Manzone was revaccinated, with forty-five other children. Syphilis was conveyed from Chiabrera to thirty-nine children, and communicated to his mother. The same disease was conveyed from Manzone to seven children and his wet nurse. Both vaccinifers were very ill, and one died three months after vaccination. Twenty nurses or mothers were known to have been similarly affected; in three cases the same disease was again communicated from the mothers to their husbands, and in three other cases the disease was communicated to other healthy children.

The annexed diagram furnishes a view of the progress of this terrible disease previously unknown at Rivalta, a village containing not more than two thousand inhabitants:

L'Union Medicate, Fev. 8eme et Avril 3eme, 1862.

GENEALOGICAL SCHEME OF THE RIVALTA SERIES OF VACCINO-SYPHILITIC INOCULATIONS.


Tube of lymph from Acqui.
Giovanni Chiabrera, First syphilitic vaccinifer; lymph bloody. Communicated the disease to
Louisa Menzone, second vaccinifer, communicated the disease to
His mother infected by contagion.
His wet nurse by contagion.
To seven other children by vaccination.
Thirty-nine other children vaccinated.
Communicated the disease to
Eighteen other mothers or nurses by contagion.
Three other children, not vaccinated, by contagion.
Three husbands from their wives by contagion.

A series of cases similar to those which occurred at Rivalta, is related by Dr. Marone to have happened at Lupara. Dr. Marone ascribed the cause of the inoculation to the admixture of some blood with the vaccine lymph.

THE LUPARA SERIES OF VACCINO-SYPHILITIC INOCULATIONS.

This series occurred in 1856, but was kept secret until the Rivalta series had been made public, and the subject was undergoing discussion in medical circles.

M. Marone, in whose practice it occurred, and who published his account of it in 1862, (Impraziale de Florence, No. 5, 1862), states that he had not dared to make it known before, partly because of his own reputation, and partly because he feared that he should injure the cause of vaccination.

Prior to 1856, syphilis had not been observed among the peasants of Lupara.

The following is the summary furnished M. Depaul (De la Syphilis Vaccinale, etc., p. 108):

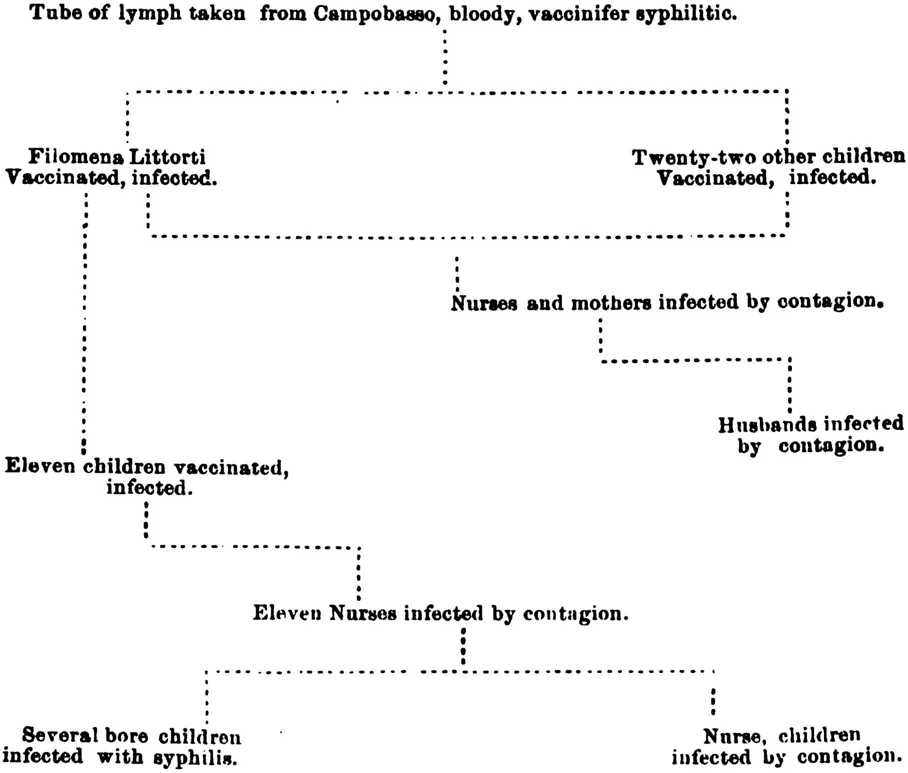
"M. Marone obtained some lymph in tubes from Campobasso; it was transparent, but tinged with blood. A large number of infants were vaccinated, and twenty-three of them were infected with syphilis. He gives the names and ages, which last varied from five to ten months. All the children, as well as their parents, were healthy at the time of the vaccination. The vaccinal eruption proceeded regularly up to the period of desiccation; but then the dry crust began to soften anew, and when it fell off an ulcer with indurated base was found to occupy its seat. In other cases the dry crust remained adherent for an unusual length of time, and then fell off.

At the expiration of a few days the cicatrix reopened and a sore was produced, having all the characters of an indurated chancre, and lasted a month or six weeks. In all the subjects indolent, non-suppurating, enlarged glands in the axilla were observed. In all of them also, toward the middle of January, the general symptoms of syphilis appeared—roseola, papules, pemphigus, mucous patches on the lips, mouth, anus and genitals, with inguinal and cervical glands engorged. The nurses were infected in their turn with indurated chancres on the breast; and at a latter period, that is, after five or eight weeks, they had also general symptoms, roseola, psoriasis, impetigo, mucous patches, etc. In their turn; also, the mothers imparted the disease to the fathers.

M. Marone has since learned that the vaccine sent from Campobasso had been furnished by a little girl who died some time after vaccination from an eruptive affection, the character of which, however, has not been thoroughly determined.

Filomena Littorti, one of the twenty-three infected, served for new vaccinations. Eleven infants were contaminated. First they had the characteristic primary affection, and then the consecutive phenomena. Mothers were again contaminated and they infected others. The disease having been at last recognized, a specific treatment was instituted; but nevertheless several of the children died. Eleven nurses, infected by the vaccinated children, infected in their turn other children who were not vaccinated, but who had been suckled by them. Several of the contaminated women, too, having fallen pregnant, were confined either prematurely or at full term of children, dead or living, but *in every case bearing the marks of congenital syphilis.*

GENEALOGICAL SCHEME OF VACCINO SYPHILITIC INOCULATIONS—LUPARA SERIES.


Tube of lymph taken from Campobasso, bloody, vaccinifer syphilitic.
Filomena Littorti Vaccinated, infected.
Twenty-two other children Vaccinated, infected.
Nurses and mothers infected by contagion.
Husbands infected by contagion.
Eleven children vaccinated, infected.
Eleven Nurses infected by contagion.
Several bore children infected with syphilis.
Nurse, children infected by contagion.

THE BERGAME OR TORRE DE BUSI SERIES OF VACCINO-SYPHILITIC INOCULATIONS.

This series was reported to the Conseil de Santé of Bergame, in 1862, by Dr. Adelasio, and is included in a paper read to the Congress of Lyons by M. Viennois. (De la Syphilis Vaccniale, etc., p. 303. Vaccination, Edward Ballard, p. 337.)

In the autumn of 1861, M. Quarenghi, a physician at Terre de Busi, vaccinated Pierre Ferrari with lymph which had been preserved from the last season six months previously. The pustules were well developed, and presented all their normal characteristics; so good were they that they were selected for the vaccination of the following season. In none of the subjects vaccinated at this time did the vaccination produce any morbid complications. It is to be observed that Ferrari died a year afterwards, it is said, of severe cough. The parents, when examined, in April, 1863, were found perfectly healthy, and they had a reputation of being moral.

On May 8, 1862, Girolama Carenini, born of parents young and in perfect health, was vaccinated with the lymph of Ferrari, preserved in tubes. It does not appear in the statement that other children were vaccinated with the same lymph. It is stated by the *mother* of the children who were vaccinated from Girolama that, although she was plump and of a good color, they noticed here and there upon her an eruption which, by the description given, was something like chicken-pox. The pustules from which the lymph was taken were fine, and the operation itself was performed *with a needle*, without any blood being drawn. When the child was examined subsequently, five natural cicatrices were found, and there was nothing observed upon the body of the child. The parents were also carefully examined, and no traces of syphilitic affection was found upon them. All that they would admit was that the child had got an eruption from exposure to the sun.

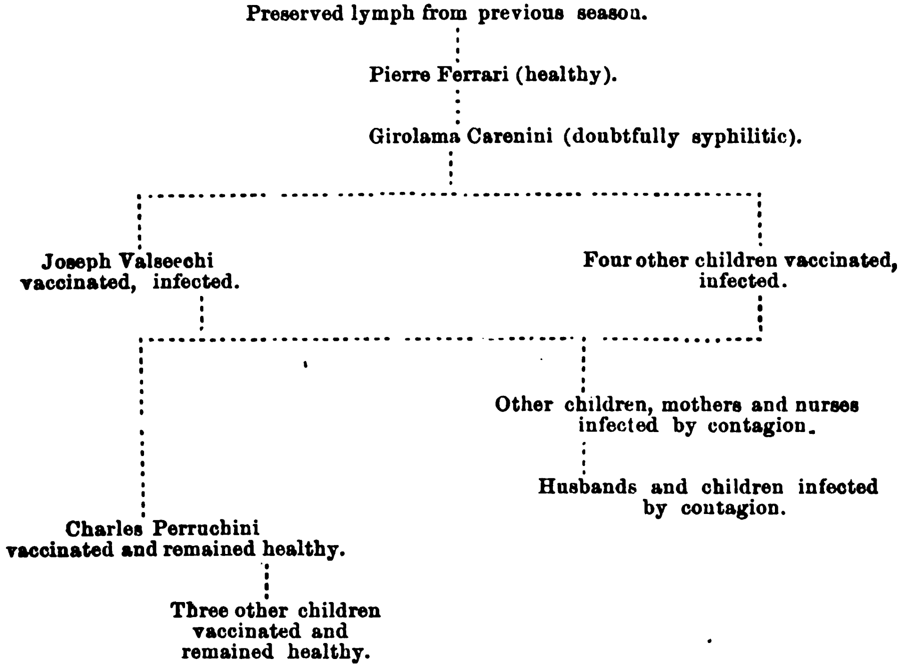
From this child, Girolama, six other children were vaccinated on the fifteenth of May (eighth day), and out of the six, five were infected with syphilis; but the vaccinator could not recollect whether the one which escaped infection was vaccinated first or last. In the case of the five infected, it is stated that the fall of the crusts was delayed, and that indurated ulcers replaced them, which were followed by secondary symptoms, which were in no case typical, but left copper-colored stains. About the same time mucous patches appeared, and the mothers and nurses were infected, and imparted the disease to their husbands. The disease spread also by contagion to brothers, sisters, aunts and cousins.

Altogether there is a record of twenty-three persons whom these children infected. One of the infected children, Joseph Valsecchi, aged five months, who infected altogether five other persons, was selected on May 23, for supplying lymph for the vaccination of five other children. It took upon all. In four of the five the healing of the pustules is said to have been rather tardy, and there was some alteration in the form of the cicatrices, and in two, there had occurred a cutaneous eruption, which got well of itself and did not affect the general health.

One of these five, Charles Perruchini, served for the vaccination of three more children, who remained perfectly healthy, only one of them presenting the cicatrices a little elevated in the middle!

These cases render it evident that the two viruses, that of vaccinia and that of syphilis, at the same spot, may both, one after another be developed there.

GENEALOGICAL SCHEME OF VACCINO-SYPHILITIC INOCULATIONS—BERGAME OR TORRE DE BUSI SERIES.


Preserved lymph from previous season.
Pierre Ferrari (healthy).
Girolama Carenini (doubtfully syphilitic).
Joseph Valsecchi vaccinated, infected.
Four other children vaccinated, infected.
Other children, mothers and nurses infected by contagion.
Husbands and children infected by contagion.
Charles Perruchini vaccinated and remained healthy.
Three other children vaccinated and remained healthy.

M. Adelasio records an additional instance of infection that happened at Almé, in the same province as Bergame, in September, 1863.

VACCINO-SYPHILITIC INOCULATIONS—AURAY SERIES.

The account of this series is given by M. De Paul. (Bulletin de l'Académie Imp. de Méd., t. 32, No. 9, p. 201.)

The first intimation of the occurrence was received by M. De Paul from Drs. Closmadeno and Denis, of Auray, who accompanied M. De Paul in his visit to the place three months afterwards, and some additional facts were obtained by a member of the Academy, M. De Kergaradec. It appears that a mid-wife, named Madame Françoise Lemouel, an experienced vaccinator, was the vaccinator of the series. She received, on May 20, 1866, some dry lymph from the Prefecture at Vannes, with which, on the next day, she vaccinated two children, in excellent health, named Mahé and De Norcy. Mahé, when visited by M. De Paul, in August, was aged fifteen months, and had *two ordinary cicatrices* on the right arm and three on the left. A little indolent axillary adenitis existed on both sides. According to the account given by the family, he had been very ill during the five weeks succeeding the vaccination, and the pustules had suppurated during seven weeks. At the time of the visit, however, he was very well in health, although he had not undergone any specific treatment, and his mother had not suffered in any way.

Jean Maire De Norcy, aged ten months, had, like the preceding child, been suckled by his mother. He was a large and fat child, and appeared in good health. He had on each arm two normal scars, only still a little red. He also had, on both sides, a little indolent axillary adenitis, cervical adenitis, but no eruption or other affection of the skin. The mother had not suffered in health; but, according to her and her husband, the child had been very ill for at least two weeks after the vaccination, the pustules suppurating during all that time. An eruption, which they called "measles," had appeared three weeks after vaccination.

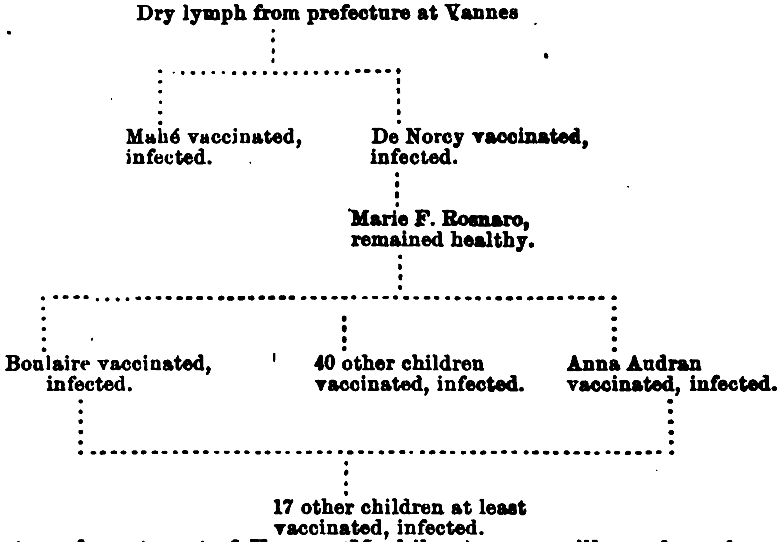
DeNorcy was used as vaccinifer on the eighth day for the vaccination of Marie Françoise Rosnaro. She presented on August 20, on each arm, six cicatrices, perfectly normal both in size and color: no trace of adenitis, cervical or axillary, and no eruption upon the skin. In a word this child was completely healthy, and in excellent general condition. Her mother, at the time of the visit, was in bed with rheumatismal pains, but M. DePaul could find nothing suspicious about her, and her nipples were free from disease. The father of the child also was found free from all syphilitic infection.

This child Rosnaro, was selected as vaccinifer for the next batch of vaccinations, of which more than eighty were made on the third, fourth and fifth of June. A list of forty-two children who suffered from syphilis, having been vaccinated from Rosnaro is given by M. DePaul; they suffered as usual, from primary ulcers at the seat of the vesicles, followed by various secondary affections. Two of them were used as vaccinifers, and their history is as follows:

Boulaire, a girl aged seventeen months, when seen in August, had fallen away a great deal, and had all the aspects of the syphilitic cachixia. There were two violet-colored cicatrices on the left arm, one upon a very manifestly indurated base, and three similar on the other arm; indolent axillary adenitis on both sides, a little posterior cervical adenitis and general roseola. The other, Anna Andran, aged nineteen months, was still suckled by her mother. There were three cicatrices of a violet tint, and reposing upon a somewhat indurated base on the left arm, and three on the right; axillary indolent adenitis on both sides, considerable on the right; axillary adenitis on both sides, considerable on the right, but less on the left; posterior cervical adenitis and general roseola.

From these children, Boulaire and Andran, a large number of vaccinations were done, certainly less, however, than from Rosnaro. M. Depaul, however, only succeeded in seeing and examining seventeen of them, and three of these seem to have had nothing amiss with them after the vaccintion, but the rest exhibited phenomena similar to those observed in Boulaire and Andran.

GENEALOGICAL SCHEME OF VACCINO-SYPHILITIC INOCULATIONS—AURAY SERIES.


Dry lymph from prefecture at Vannes
Mahé vaccinated, infected.
De Norcy vaccinated, infected.
Marie F. Rosnaro, remained healthy.
Boulaire vaccinated, infected.
40 other children vaccinated, infected.
Anna Audran vaccinated, infected.
17 other children at least vaccinated, infected.

In a western department of France (Morbihan), some villages have been the theatre of severe syphilitic symptoms in more than thirty children, who had all been vaccinated from a little girl with six punctures on each arm, the child herself having been operated upon from another who had been vaccinated from lymph preserved between two plates of glass obtained from the authorities. This misfortune created so much sensation, that the Academy of Medicine of Paris sent down two commissioners. Messrs. Henry Rogu and Depaul. These gentlemen presented their report to the Academy, and this important document ends with the following considerations:

1. Several of the children whom we have examined were undoubtedly suffering from secondary syphilis.
2. We see no way of explaining this contamination but by vaccination, and we are confident that the cases we have seen were really syphilis engendered by vaccination.
3. As to the origin of the virus, it is very probable that the poison is traceable to the lymph, preserved between two pieces of glass, supplied by the authorities.

As primary symptoms were also observed among the children M. Ricord begged the commissioners to insert that fact in their report, which these gentlemen agreed to do. Here we unfortunately have again repeated the sad occurrences which took place at Rivalta (Italy), a short time ago.—(Medical News and Library, 1867—from London Lancet, December 15, 1866.)

The experience of the Confederate surgeons, establishing the possibility of communicating constitutional syphilis by vaccination; the experiments of Waller, Pelpizzari and others, establishing the possibility of communicating secondary syphilis by inoculation of the blood from patients suffering with the constitutional symptoms of this disease into healthy individuals; the cases collected by M. Viennois illustrating the transmission of syphilis by vaccination; and the unfortunate tragedy of Rivalta in the district of Piedmont, Italy, where syphilis was previously unknown, (forty-six children of various ages being simultaneously attacked with well-marked syphilis, proceeding in all cases which could be properly examined from the action of vaccine virus which produced chancre on the arms, followed by buboes in the axilla, and all these children had been vaccinated directly or indirectly from a single child, who was subsequently proved to have contracted syphilis from a wet nurse, and these children transmitted the disease to a number of women, their wet nurses and mothers, and even to children who played and nursed with them, and the women so infected, in turn infected their husbands, and finally the disease yielded in all cases to the usual remedies for syphilis); these, and other similar facts, as the infection of the infant at the breast with secondary syphilis, and the communication of syphilis from the infant inheriting the disease from its mother or father, to a healthy nurse, all demonstrate the possibility of transmitting constitutional syphilis by inoculation of syphilitic blood, or vaccine virus, from patients poisoned with syphilis; and each such fact, of itself is sufficient to overthrow the dogma, that "primary syphilis alone is capable of being inoculated, and that secondary affections and the constitutional disease cannot be communicated from one individual to another, by any such means as vaccination, or the direct inoculation of syphilitic blood."

Mr. Jonathan Hutchinson, narrates no less then four series of cases in which syphilis was communicated by vaccination, in volumes 54 and 56 of the Medico Chirurgical Transactions. Such is the importance of this subject that we reproduce the observations of this distinguished surgeon, together with the report of the committee.

REPORT ON VACCINO SYPHILIS, BY MR. JONATHAN HUTCHINSON.

INTRODUCTION.

The following report contains the narrative of two separate series of cases. At the time of my first report (which was read before the society on April 25) only one of these had come under my notice, and at that time none of the patients in it had passed further than the primary stage. The discussion of this paper was adjourned for a fortnight, and during this interval the second series of cases had been brought under my notice. At the adjourned meeting I presented a report upon them, with also some further particulars regarding the first. A second appendix was presented to the society at its last meeting (June 27), bringing the narrative of both series up to that date. At that time many of the subjects of the second series had presented all the symptoms of constitutional syphilis in its most typical form of evolution, while none of those in the first had shown any constitutional phenomena which could be pronounced beyond dispute. This difference I was inclined to explain by reference to the fact that all in the first series had taken mercury, while none of those in the second had had any treatment. That this suggestion was correct has since been proved by the occurrence, in four of the first group, of secondary lesions of the most unmistakable kind.

At the request of the Council, I have remodelled my original paper, with its two appendices, and endeavored to bring all the facts of both series into a continuous narrative up to the present date. As regards the main points, the cases will, I believe, be found amply sufficient, but I am well aware that respecting some individual ones there is less detail than could have been wished. The peculiar conditions under which the inquiry has been conducted, the necessity for avoiding any steps likely to excite the alarm of the patients, and other circumstances to which I need not avert, have prevented me from keeping all the cases under such close observation as might for some purposes have been desirable.

FIRST SERIES OF CASES.

Synopsis.—Twelve Persons, mostly Young Adults, Vaccinated from a Healthy-Looking Child—Satisfactory Progress of the Vaccination in All—Indurated Chancres on the Arms of Ten of the Vaccinated in the Eighth Week—Treatment by Mercury in All—Rapid Disappearance of the Primary Sores—Constitutional Symptoms in Four of the Patients Five Months after the Vaccination—The Vaccinifer Showing Condylomata at the Age of Six Months.

These patients came under my observation in the seventh week after vaccination. The suspicions of the vaccinator had been excited about a fortnight earlier, and he had applied to the medical officers of the Privy Council on the subject. It was on the advice of Dr. Seaton that I was requested to see the patients and investigate the matter. It was with the permission, and, indeed, the suggestion, of the surgeon in whose practice it occurred (the father of the vaccinator) that the facts were made known to the profession, and I cannot help expressing here my admiration of the moral courage with which this gentleman met a calamity which caused him the keenest distress, and of the anxiety which he displayed that the fullest use should be made of it for the public good.

On February 7, 1871, a young surgeon in the neighborhood of London applied at a public vaccine station for a supply of lymph. He was offered a healthy-looking infant of four months old, then on the eighth day, and with five good vesicles. As he wished to vaccinate a considerable number of persons in the same house, he preferred to borrow the child rather than, as first proposed, to charge points, and an arrangement having been made with the mother, the child was at once taken to a private house where eleven young adults (shopmen and servants) were vaccinated from its arm. Four only of the five vesicles were used, and the testimony, both of the operator and the child's mother, is that more than one, and possibly all, of them bled somewhat. Finally, a tube was charged, and with the lymph thus obtained, which is reported to have looked quite clear, two persons, a father and son, residing in another house, were immediately afterwards vaccinated. Thus we have a total of thirteen persons vaccinated. In all, excepting one doubtful case, the vaccination was second to successful performance of the same in childhood. In the doubtful case both arms were done; in all the others, only one arm. In all, excepting one instance, the vaccination took, and the vesicles are believed to have gone through their usual stages. The patients were not under any close medical inspection afterwards, as none of them needed it, but it seems certain from their testimony that at the end of three weeks in all cases the scabs had fallen and small round cicatrices alone remained. At the end of a month, or from a month to five weeks, several of them applied for advice because the scars were again becoming sore, and at the expiration of two months it was quite certain that ten out of the twelve had indurated chancres on their arms. Many of them had more than one chancre, and about half had enlarged axillary glands, whilst two or three suffered from febrile disturbance with roseolous rash. I will append to this paper some brief notes of each of the cases, but it will be convenient for the present to restrict our attention to the general facts as to the group, and to turn next to the vaccinifer.

FACTS AS TO THE VACCINIFER.

The infant had been seen by the public vaccinator, whose patient she was, and by the surgeon who borrowed her, and to them, to her own mother, and to those who were vaccinated arm to arm from her, she bore the aspect of general health. She was remarkably well grown, not in the least fretful, and had gone through the stages of her own vaccination perfectly well.

On April 5, two months after the vaccination, she was brought to my house for examination. Her mother ridiculed the idea that she ailed anything. My attention was, however, at once attracted to a slight peculiarity in the tint of her skin and to the look of her face; and although it was strongly denied that she had ever "snuffled," yet when she was made to cry I noticed a nasal twang which was very suspicious. On having her stripped not a single spot of rash could be seen on the skin, but on inspecting the buttocks five small circular condylomata were discovered close to the anus, about which there could not be the slightest doubt. Her mother now admitted that she had been aware for a week of the existence of these sores, and had consulted a chemist about them, who had attributed them to teething. She said they had not been present more than a week, and repeated her assurance that the infant had not seemed in the least ill. I could not find in the mother herself any indications of syphilitic taint, nor obtain any history of suspicious symptoms. She looked pale and cachectic, as if underfed. She had been married about eighteen months, and this was her first-born child. Her husband was a Frenchman and one of the Paris National Guard. I prescribed for the child some mercurial ointment, and was very desirous to keep it regularly under observation, but the mother would not bring it. A fortnight later (on April 19), I sought it out at home. The child then looked more ill than when I first saw it; the condylomata were in the same condition. It had no rash. Its head was enlarging, and its mother complained that it was wasting away. She had not used the ointment, alleging that its father would not allow her to do so. I was never able to see the father of the child, although I used every endeavor; he was evidently unwilling to be seen, and his wife positively refused to give me his address.

About the existence of constitutional syphilis in the infant at the date of my examination (two months after the vaccination) there could not be any doubt, and scarcely any as to the taint having been an inherited one. The vaccination spots presented perfectly healthy scars, and there was not the slightest reason for thinking that the disease was introduced into the child's system at the time of its vaccination. Had such been the case it is almost certain that it would now present symptoms similar to those in the patients vaccinated from it, *i. e.*, primary sores on the arm. There could be only a week's difference in the stage of the disease in itself and in those vaccinated from it. Instead of this we find the child presenting the ordinary symptoms of hereditary syphilis,—condylomata, commencing marasmus, and hydrocephalus. That a syphilitic infant should appear to be in perfect health, as far as external appearance is concerned, is by no means unusual. "It is a mistake to suppose that syphilitic infants always present a withered 'old-man-like' aspect; in many instances, although manifesting specific local symptoms, they may grow well and remain plump and fat." This occurs, I believe, with especial frequency when the child does not suffer from a skin eruption, and under such circumstances condylomata are not infrequently the only symptom by which the existence of the tint is proved.

There can, I think, be little doubt that in this instance it was the blood, and not the vaccine lymph, which was the source of contamination.

Two of those vaccinated wholly escaped, and as they were two of the youngest on the list, and mere boys, it is very improbable that their immunity was consequent upon their having had syphilis before. In those in whom chancres occurred, nearly half of the vaccination punctures escaped. Now, I can see no other explanation of this immunity of some persons whilst others suffered, and immunity of some vaccination punctures in the same person in whom others were infected, than by supposing that the vaccine virus and the syphilitic virus were present in different fluids, and that it was possible to convey the one in all its vigor without necessarily conveying the other. It is important in reference to this point to note that the two individuals who have escaped were the two who were first vaccinated, since it is not improbable that the lymph which first flowed was unmixed with blood. I may add also that the third person vaccinated was the only one in whom both arms were done, and that one of his arms escaped whilst the second suffered. The conjecture may be permitted that it was when obtaining lymph for this patient's second arm that the operator first drew blood.

The success or non-success of the vaccination, as vaccination, seems to have had nothing to do with the induration of the scars. Some scars in which the vaccination vesicle had not "taken" became indurated, whilst many punctures which did "take" escaped. Owing to the patients not having been constantly under observation after the vaccination, there is a little uncertainty as to which vesicles were well-developed and which failed, since we are obliged to rely to a considerable extent on the statements of the patients themselves. There seems reason to believe that the vaccination failed in all the spots in only one individual, and he subsequently had several indurated chancres at the sites of puncture.

The period of incubation seems to have been very nearly the same in all the cases. Two of the patients, a father and son, noticed that their scars were becoming irritable on the same day, the eighteenth of March, a little more than five weeks after the vaccination, and between two and three weeks from the cicatrization of the vaccine vesicles. In all the patients the spots were characteristically indurated when I saw them on April 4th, exactly two months from the date of the vaccination. It would have been of great interest to science to have allowed half of this group of patients to abstain from any specific treatment, but, on the other hand, it appeared a paramount duty to adopt at once the very best means for their recovery. On the fourth of April, they all commenced, with one exception, the use of mercury in small doses, and the application of black-wash. In all the effect of the remedy upon the local sore was most definite. Many of them, at the date of my first paper, had become (after eleven days' treatment) quite soft; in the course of a week none of them displayed a degree of induration which would have been considered characteristic, and several which had been ulcerated were healed.

One important feature in this group of cases is the remarkably close similarity which they bear to each other. In no single case was there any unusual degree of inflammation of the vaccine vesicle. In all, as far as the patient's impressions go, the vesicles went through a usual course, and in all a period intervened, before the development of induration, during which the cicatrix was quite healthy. As the patients were not at the time under medical inspection it is impossible to be accurate as to the precise day on which induration of the cicatrices began, but so far as can be ascertained there is reason to believe that nine out of the eleven began to complain of inflammation of the scar towards the end of the sixth week. At the end of the eighth week these nine patients had all reached the same stage. In the other two cases the progress was about a fortnight behind hand.

The characters assumed by the sores were, with some minor differences as to size, etc., remarkably similar. Ulceration occurred in all excepting two patients, and in one of these two, out of three chancres, one did for a day or two ulcerate slightly. In one patient, a healthy, florid girl of seventeen, three glossy buttons of induration formed, but never passed into the ulcerative stage. It is not improbable, however, that they were arrested by the influence of mercury. Of those which ulcerated all took the circular form, and in all, in the first instance, the discharge was stated to have been "glutinous." They had all been dressed with water dressing for several days before I saw them, and had much improved in appearance; some of them were secreting healthy pus, but most of them still showed deficiency of secretion. None of the patients were out of health at the time of the occurrence, but they varied a good deal as to temperament and degree of vigor. There is no reason to think that any of them had suffered from syphilis before. About half of them complained that they had headache and felt more or less unwell during the time that the sores were indurating. One young man was confined to his bed with severe aching in the back, vomiting, and general febrile disturbance, all of which passed off in a few days. Most of them had more or less enlargement of the glands in the axilla, but none did it occasion any material pain or inconvenience. In all but one mercurial treatment was commenced on the fourth of April, two months after the vaccination, and about a fortnight after the scars had begun to indurate, and the uniformity with which all the sores altered in character under its exhibition was most remarkable. In the two cases in which ulceration had not occurred, the sores never passed beyond the stage of induration. The sores which were ulcerated when mercury was begun, in the course of about a week after its commencement, began to discharge healthy pus and to show florid granulations. Most of them, as already stated, were healed within a fortnight, and after three weeks the majority were quite sound and almost free from induration in all. In all cases the mercurial treatment consisted in two grains of gray powder given night and morning, with the application of black-wash under gutta-percha tissue. About half the patients showed slightly the influence of mercury on the mouth, but none were particularly inconvenienced. In one case the patient did not come under treatment till ten days after the others, having, indeed, in the first instance, consulted a homœopath. In him the chancre attained a size twice that of the largest of the others.

The following paragraphs are extracted without modification from my first report (April 25th), as I have special reasons for wishing to preserve their original form:

"As already stated, none of the patients have as yet displayed any of the persistent forms of skin rash, nor have any shown positive ulceration of the tonsils. Several of them have had transitory, but definite, eruptions of roseola, and in several the skin of the abdomen and chest is slightly mottled. Three of them to-day display about the neck, face and shoulders, a few lichenoid spots of doubtful character.

"It is to be feared that before long we shall have yet more definite evidences of constitutional contamination in some of these patients; but in the present stage I think we are quite justified in deducing the following conclusions from them:

"1st. That the blood of a child suffering from inherited syphilis can, if inoculated, transmit the disease with great certainty.

"2d. That the result of such inoculation of blood will be an indurated chancre.

"3d. That if multiple inoculations be practiced, multiple chancres may be produced.

"4th. That a period of incubation between the inoculation and the first occurrence of induration about the prick will occur, during which the part may appear perfectly healthy.

"5th. That the period of incubation prior to the first specific induration will usually be about five weeks.

"6th. That it is quite possible for vaccine lymph and blood to be transferred at the same time, and for each to produce its specific results, the effects of the syphilitic inoculation occurring subsequently to those of vaccination.

"7th. That it is quite possible to vaccinate successfully from a syphilitic infant in the stage of utmost potency as regards its blood, without communicating syphilis."

The following are some particulars respecting all the persons vaccinated in this series. The cases are arranged according to the order in which vaccination was performed:

No. 1. Master W——, a youth of 14. He was vaccinated in three places, all of which took, and went through their usual course. No ill consequences followed. On April 8, I examined his scars, and found them pale and quite normal.

No. 2. W. N——, æt. 16. Only one of three spots took. No ill consequences followed. On the eighth of April, I found the scar of the vesicle which succeeded pale and healthy.

No. 3. Mr. T. B——, æt. 20, a young man of fair complexion and somewhat delicate appearance. As he had no scars of a former vaccination, it was thought best to vaccinate him on both arms. This was accordingly done in three places on each; in two or three on each arm the vaccination took and scabs resulted. He left the establishment shortly afterwards, and at the time of my first visit I did not see him. Having obtained his address, he was subsequently induced to come to my house. This was at the end of two months after vaccination. He had then one large ulceration with indurated edges and prominent granulations in the middle. This chancre, which was as large as a florin, had resulted from the confluence of two vaccination sores. He stated, as regards the vaccination, that the scabs fell within three weeks, and that the sores then seemed quite well. During the sixth week two of the spots on his left arm inflamed and became hard, and during the following week he had a good deal of febrile disturbance. He had an enlarged but softish gland in the left axilla. Mercurial treatment[*] was commenced in the end of the ninth week, and continued for two months. The chancre was quite healed in about a month, but the scar remained hard and dusky. He had a few suspicious lichen spots in the thirteenth week, but nothing characteristic. He never had any sore throat, and his general health remained throughout good.

No. 4. Mary Jane L——, æt. 18. Three spots took and went through their stages. About six weeks after the vaccination all three became inflamed, and they subsequently indurated. On April 4, they were all indurated and superficially ulcerated (see sketch). There was an enlarged gland in the axilla, movable, but not very hard. During the preceding week she had had some febrile disturbance. Mercurial treatment was commenced at the end of the eighth week, and was pushed to slight ptyallism. She subsequently had some diarrhœa, and could not continue the mercury regularly. The chancres soon healed. In the thirteenth week she reported that she had a rash, which came and went, but I never saw anything positive. She was of strumous diathesis, and a large glandular mass in the neck, which had shown itself in the eighth week, persisted ever afterwards. In the middle of July, all specific treatment having been suspended for more than two months, she had a rash on the neck, fronts of arms, etc. It consisted of small, slightly scaly papules, of dusky color. She had also symmetrical ulcers in the tonsils. Mercurial treatment was at once recommenced, and the rash soon began to fade. She was seen a few days later by the Society's Committee. On August 1, all traces of the rash had disappeared, but the ulcers in the tonsils persisted. On September 4 she was seen by Mr. Smith, secretary of the committee. . At this date she had no rash, but the ulcers in the tonsils were still characteristic.

No. 5. Caroline R——, æt. 24, stout and florid, was vaccinated in three spots, two of which took slightly and one well. After they had been for some time soundly healed, they relapsed about the twentieth of March and became red and irritable. She had at this time backache and flying pains. There was no swelling in the axilla. Mercurial treatment was commenced at the end of the eighth week, and was pushed to decided salivation at the end of ten days, after which she took only one pill daily. At the end of a month the sores were all healed and the scars soft. She had on several occasions shown a few suspicious spots about the neck, but characteristic, and she had had no sore throat Throughout she had complained a good deal of rheumatoid, etc., but she kept at her work. In the middle of July, at the same time as in the preceding case, a characteristic rash attended with ulcers in the tonsils showed itself. Mercury, which had been suspended for two months, was resumed, and the rash soon disappeared. On the first of August she was quite well, with the exception of two or three spots which persisted on her neck. In the beginning of September, she had a relapse of ulceration in one tonsil, but it was very slight. Her general health at this time was good.

No. 6. Annie W——, a florid, robust girl, æt. 17. The three vaccination spots took well, went through their normal stages, and healed. On April 4 (eighth week) the outer one showed slight induration, but was not in any degree ulcerated. The other two were reddened, but not at all hard.

She said they were redder than they had been a week before, and that they were beginning to itch. She felt perfectly well. Three days later all three spots had become slightly harder. None of them ever passed into open ulcers, and under mercurial treatment all induration disappeared in the course of three weeks. I believe she took the mercury afterwards very irregularly. No constitutional symptoms of any kind ever showed themselves.

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[*] By "mercurial treatment" throughout this paper may be understood the careful use of black-wash applied to the sore three times daily, and protected with oil-silk, and the administration internally of two grains of *gray powder* twice or three times a day, according to circumstances.

No. 7. Lucy L——, æt. 20. All the four vaccination punctures took well, and healed in due course. Nothing followed until the last days of March (beginning of eighth week), when the two inner spots became red, hard, and irritable. On April 4, the two outer scars still showed no sign of irritation, but the two inner ones were of a dusky red, somewhat raised, hard, and covered with thin epidermit scale. She complained that they felt sore. She had no other symptoms. No axillary bubo. In this case the chancres never ulcerated. Under the influence of mercury the induration disappeared. For a short time in the tenth week her tonsils were suspiciously inflamed, but she never had any rash. Cod liver oil was given most of the time, as she was in delicate health, and had a cough.

No. 8. Mr. T——, æt. 20. Three vaccination places took, and the fourth did not. These scars remained quite sound until April 1, (eighth week). I saw him on April 8, and found one of the scars inflamed, slightly hard at the base, and covered with a scab. The other three were quiet. He said that he felt well. There were some hard glands in the axilla. Mercury was at once commenced, and the sore, which had ulcerated, soon healed. The mercury never produced any ptyalism, and, excepting a little headache, he felt quite well throughout. On the fifth of May the scar was sound, but still hard, and the glands in the axilla could still be felt. My notes mention "some small spots on neck and shoulders, fairly characteristic." The spots alluded to had disappeared at my next visit. He subsequently remained quite well until the middle of July, when he had a general roseolous eruption, which, however, disappeared in a week, when mercury was resumed.

No. 9. Mr. H——, æt. 22, of fair complexion and delicate. Lymph was inserted at three places, and good vesicles developed at two. They all healed well, but about March 20 the inner one began to inflame. On April 4, when I saw him, he complained of having felt dull and heavy during the last week. The spot, which had inflamed, was raised and hard. On each tonsil there was a slightly marked patch of suspicious appearance, but not actually ulcerated. Mercury was commenced at this date. The chancre soon healed. The throat was slightly sore for about a week, and after this, excepting some complaint of frontal headache, he had no symptoms. On May 5, the chancre, which had been healed for more than a week, scarcely showed any induration. He felt quite well, and had no rash. Mercury was continued once a day for a month longer, and then disused.

No. 10. Mr. W——, æt. 18, a rather delicate young man of dark complexion. He was vaccinated in three places, but none of them took. The inner one inflamed a little, but soon healed. On the twenty-second of March the inner one had again inflamed, and was becoming hard. On April 1 he felt ill, had backache, thirst and headache; and on the second a succession of slight rigors, with frequent sickness, came on. When I saw him, on April 4, he was in bed, on account of his backache and feverishness. There was an enlarged gland in his axilla, and the skin of his abdomen was a little mottled. Only one of the vaccination spots was affected, and it was exactly like those in the other cases—raised, hard and inflamed. Nothing could be seen on his tonsils. On April 8 he was much better, having lost his backache. He stated that on the seventh his body and face were covered with a blotchy rash, but, with the exception of a very slight mottling of the abdomen, this had disappeared on the eighth. On the fifth of May he had congestion of the right eye and circumorbital pain, but no positive iritis resulted. At the same time he had a lichenoid eruption on shoulders, arms and face, but as it was mixed with acne, to which he had been previously liable, it was not easy to be confident as to its character. On account of diarrhœa, the mercury had been omitted.

No. 11. Mr. W——, aged 45, a married gentleman, the father of a healthy family, and who had never, at any time, suffered from syphilis. He was vaccinated in three places, two of which took, went through their stages and cicatrized. The middle one of the three did not take. On or about March 18, all three inflamed, and when I saw them, on April 4, they were all indurated and ulcerated. He had no enlarged glands, nor any other symptom. On April 8, his condition was much the same; he was taking mercury twice a day; the thermometer had been used regularly, and had not shown any elevation of temperature. On the 11th, the mercurial was omitted, as he was decidedly salivated. On the 14th, two of the sores were quite healed, and the other showed healthy granulations. After this he continued the liberal use of black-wash, but took no more mercury internally. From the 10th to the 24th, his mouth was slightly sore, and the mercurial odor was perceptible in his breath. Subsequently, he remained quite well as regards syphilitic symptoms until the latter end of June. We had sent him to the seaside, as he had not regained quite his ordinary strength. Whilst there he rapidly improved, but a copious eruption came out on his scrotum, thighs and scalp. He thought it had been excited by bathing. He returned to town three weeks later, and I saw him in the middle of July. His scrotum, penis, and the inner sides of his thighs, were covered with flat-topped papules and patches of psoriasis of the most characteristic kind. He had no rash worth mention on other parts of his body, but his scalp, which was bald, was covered with small patches of porrigo. Under the use of mercurial ointment and small doses of mercury internally, both the scrotum and scalp rapidly healed.

No. 12. Mr. W——, Jr., æt. 18, son of the subject of Case 11. He was of brown complexion and in tolerable health, but had been for years the subject of enlarged tonsils. Three out of four of his vaccination spots took, went through their usual stages, and healed. On the eighteenth of March, two of the three spots which had taken became a little inflamed and irritable, and during the next week they gradually indurated. He consulted his surgeon about them on the 24th, and on April 4 I saw him. The outermost of the three spots then showed a healthy cicatrix, but the inner and middle ones were inflamed, slightly raised, superficially ulcerated, and decidedly indurated at the base. He had no other symptoms. No definite glandular swelling. Mercury was prescribed, and under its influence the sores softened and healed. He was never positively salivated, but the occurrence of slight diarrhœa several times interrupted the mercurial course. Up to the present date he has not had any secondary symptoms, with the exception of a doubtful roseolous rash in the beginning of May. He took mercury in all for about a month.

SECOND SERIES OF CASES.

SYNOPSIS—UNQUESTIONABLE SYMPTOMS OF CONSTITUTIONAL SYPHILIS IN NINE CHILDREN WHO HAD BEEN VACCINATED FROM THE SAME PATIENT—SUSPICIOUS SYMPTOMS IN SIX OTHERS, AND ENTIRE ESCAPE OF A CERTAIN NUMBER—VACCINIFER A FINE HEALTHY LOOKING CHILD, BUT WITH SLIGHT LOCAL SYMPTOMS INDICATIVE OF INHERITED SYPHILIS.

On May 5, 1871, two children were brought under the care of my friend and colleague, Mr. Warren Tay, on account of syphilitic eruptions. They were a brother and sister, aged respectively four years and sixteen months, and in both the syphilitic rash was very definite. In searching for its cause Mr. Tay found that about seven weeks previously they had been vaccinated, and that the vaccination spots were at the present time unhealed, and with very decided induration at their bases. Mr. Tay now brought the cases to me, and I am indebted to his courtesy for permission to investigate the facts respecting them, and also for much help in doing so. We obtained from the mother of the children the name of the vaccinator, and on application to him were at once supplied with his vaccination register, and allowed to copy out the names and addresses of twenty-four other patients who had been vaccinated at the same time from the same vaccinifer. Nothing had occurred to excite the vaccinator's suspicions, not a single one of this series having been taken back to him on account of the unhealthy condition of the arm. On making inquiries at the houses of the patients, however, we found that no fewer than nine had chancres on their arms, and that six were suffering from well-marked and copious syphilitic rash. Two of them had been under medical care for these symptoms, but not in a single case had the real nature of the disease been suspected. I will state *seriatim* the chief facts respecting these cases in this series, but it will be convenient first to mention those which concern the vaccinifer.

HISTORY OF THE VACCINIFER.

I visited the child at its home, the parents having no knowledge of the object of my visit. I found it a stout, well-grown male infant, of seven months old. Thus, he would be four months old at the date of vaccination. His mother stated that he was selected as a vaccinifer from amongst several others, as being the most healthy present, and that his vaccination spots were very good ones. They healed afterwards quite well, and the scars remained sound. He still looked healthy, and was well grown and cheerful. Excepting a little transitory "tooth-rash," probably lichen, on the face, he had had no eruption. His head was decidedly large, and the fontanelles widely open. This had, his mother said, only been noticed for a few weeks. Latterly, several neighbors had told her that he had "water on the brain." I inquired as to snuffles, and she replied at once and emphatically, "Yes, he has snuffled a great deal." There was no trace of rash in the child's skin at the time of my visit, but at the anus was a single small condylomatous patch just healing. This had never attracted his mother's attention. He was said to have had thrush. His mother was a young and healthy-looking woman, who had been married two years. I did not, of course, ask her any direct questions.

Immediately afterwards I called on the father of the child, and in answer to a direct question, he denied very positively having ever been the subject of venereal disease. On a subsequent occasion he submitted to a personal examination at my house, and we failed to detect anything of a nature to cast suspicion on his denial. I saw the infant two or three times during the next six weeks, but no symptoms of a more definite character showed themselves. The condyloma soon healed, and, with the exception of a slight tendency to hydrocephalus, the infant at the time I last saw it might have been regarded as a specimen of excellent health. As regards its condition at the date of vaccination, I may state that the parents of several of those vaccinated from it subsequently mentioned to me its very healthy appearance.

No trustworthy evidence could be obtained as to whether blood was or was not transferred in the act of vaccination. The vaccinator, who is a very able and careful surgeon, assured me that it was his custom to avoid blood-stained lymph, and several of the women who witnessed the proceedings told me that they did not observe any bleeding. In addition to the number of children vaccinated directly from its arms, some tubes were also charged with its lymph. These tubes, having been mixed with others, could not be traced.

The following are the particulars of all the patients vaccinated from this vaccinifer:

No. 1. Arthur Edward T——, æt. 16 months, one of those first seen by Mr. Tay. He had been vaccinated for the first time on February 13, and five of the punctures were successful. The spots healed, but subsequently became hard. When he applied to Mr. Tay, in May, the scars were decidedly indurated, but not ulcerated; there were enlarged glands in the axilla; he had symmetrical ulcers on the tonsils, and a moderately copious rash of mixed roseola and psoriasis on the trunk and limbs. He was treated by mercury, and his symptoms slowly disappeared.

No. 2. Elizabeth T——, æt. 4 years, sister of the above patient. She was vaccinated for the first time at the same date, and five of the punctures took well. They went their usual stages and healed. Afterwards the scars inflamed and ulcerated. When she was seen by Mr. Tay on May 5, she presented superficial sores with slightly indurated bases, and covered with a good deal of scab on the seat of the vaccination scars. The glands in the armpit were enlarged. She showed deep symmetrical ulcers on the tonsils nearly healed, and she had a copious rash of papules and small scaly patches on the body, the color, arrangement, and general appearances of which were most characteristic. This eruption was most symmetrical, and occurred especially on the back of the neck, the bend of each elbow, and the thighs and hips. Under mercurial treatment the chancres healed and the rash disappeared.

No. 3. William C——, æt. 10 years. His was a second vaccination, but three of the punctures were followed by good vesicles. The vaccination spots were healed. He became the subject of rheumatoid pains, and had a copious rash over the whole body. When seen by me at the end of thirteenth week he had already been for several weeks under medical treatment. The vaccination chancres were just healed, but were still inflamed, indurated, of a dusky red color, and covered with a dry papery scab. There was a gland as large as a walnut in the axilla. Each tonsil showed a well-marked gray-based ulceration. The rash, although evidently fading, was still abundant. It occurred symmetrically on the neck, arms, trunk, and thighs. It was copious both on the backs and fronts of the arms, especially so on the outsides of the thighs.

No. 4. Eliza T——, æt. 14, a re-vaccination; four or five of the punctures took; the crusts fell in about a fortnight, and the scars remained sound for three weeks afterwards. Five weeks after vaccination they inflamed and became hard, and "a white skin came over them," but they never reulcerated. She had a painful lump in the armpit during the first week after vaccination, but it subsequently disappeared. During the twelfth week she first noticed an eruption on the chest, and at this time she had some cough and felt ill, as if she had taken cold. She was now placed under the care of a surgeon. I first saw her on May 17, the first day of the fourteenth week. At that date her vaccination spots were soundly healed, but the scars were dusky and covered with a papery scale; none of them were indurated There was a slightly enlarged movable gland in the armpit. She had symmetrical ulcers in the tonsils, with white borders. There was a sparing eruption of dusky lichen spots on her chest, chiefly below the nipples. There were a very few spots also on the chest and upper part of the neck, but none on the arms. Up to this date the patient had taken no mercury.

No. 5. Maria H——, æt. 3; a first vaccination; four punctures took. When visited in the fourteenth week she was found to have symmetrical ulcers in the tonsils, a slightly enlarged gland in the axilla, and an eruption of dusky psoriasis on the back and outer sides of the thighs. One of the vaccination scars was slightly indurated and dusky, with a thin papery scale; the others were sound. The rash had only been noticed for a few days. The child had been for some time under the care of a surgeon for "inflammation of the lungs." Up to this date the child had taken no mercury, and the treatment afterwards was conducted with extreme irregularity. On September 6, after an interval of two months, during which the child was lost sight of, it again came under care on account of condylomata at the anus.

No. 6. Eliza M——, æt. 17; revaccination, four places took. On May 16, end of the thirteenth week, the sores had only just healed, and their scars were slightly indurated, dusky, and covered with a dry scale. There was a slightly enlarged gland in the axilla, and she had a few scaly papules of dusky red color on the upper parts of the legs, but none elsewhere. She was florid and in good health.

No. 7. This patient, Hannah S——, was not found.

No. 8. Elias W——, æt. 1 year; a first vaccination; four punctures took. At the end of the twelfth week the sores were not healed, but were covered with porrigo scab. There was, however, no evidence of syphilis, and the child had been the subject of porrigo before vaccination.

No. 9. Mary Anne O——, æt. 11; a re-vaccination; five places took. The sores healed very slowly, and had only just closed at the end of the thirteenth week. Their scars were then dusky and red, with a thin dry scale and slight induration. There were a few dusky papules on the back of her neck, and one in front of the right elbow. The patches were either smooth and glossy, or covered with a thin scale. There was a large indolent swelling in the axilla. The child had not been out of health, and no treatment had been adopted.

No. 10. Amelia O——, æt. 5 years; first vaccination; five places took. The sores healed in about five weeks, and the scars, when examined, at the end of the thirteenth week, were scaly and somewhat congested, but not indurated. The axillary glands were slightly enlarged. She had no eruption excepting some patches of dry eczema on the face. It is probable that she was not syphilitic.

No. 11. Frances C——, æt. 4 years. I do not know more respecting this child than that the vaccination sores healed slowly, and that during the eighth week she had a rash of red pimples. She was not seen.

No. 12. Alice C——, æt. 5¼ years, sister of the above. Facts as to vaccination very similar.

No. 13. Henry C——, æt. 8 years, brother of the above. On May 8, end of twelfth week, two or three of his vaccination spots were still unhealed and covered with porrigo scab. He was reported to have had a rash like his sisters, but neither in him nor them was there anything positively syphilitic.

No. 14. Emily Julia J——, æt. 6; first vaccination; five places took. The places healed up at the end of the third week, but subsequently inflamed and reopened. On May 17, fourteenth week, the four lower spots were healed, but hard, glossy and dusky. The upper one was covered with a dry pus-scab, and its base, as large as a shilling, considerably indurated. She had an enlarged gland on the border of the axilla. The lower part of the chest, the whole of the abdomen and the back were covered with a lichenoid rash, and there were a few spots on the front of the elbows and on the thighs. The rash had probably been out about a fortnight. There were symmetrical ulcers in the tonsils, and she had been low-spirited and ailing. Mercurial treatment, one grain of gray powder twice a day, was commenced on the seventeenth. On the thirtieth, all traces of the rash and of the ulcers in the throat had disappeared, and she was in good health. The vaccination scars were still dusky and somewhat indurated.

No. 15. Alfred J——, æt. 9, and brother of the above. A first vaccination; five places took, and all healed during the third week. They afterwards inflamed and reopened. In the beginning of the fourteenth week the scars were dusky, and there was an enlarged gland in the axilla. He had no rash of a positive character, but a suspicious mottling of the skin of the abdomen.

No. 26 Annie J——, æt. 3 years, sister of the above. All the four vaccination punctures healed well in the usual time, but subsequently reopened. An abscess formed in the armpit and broke. It was said that she had scarlet-fever soon after the vaccination. At the beginning of the fourteenth week all the sores were well healed, but the scars were slightly dusky. She had no rash.

A young woman who was vaccinated from this child suffered no ill consequences.

No. 17. Herbert D——, æt. 5 years. In this case nothing unusual occurred.

No. 18. Alfred George H——, æt. 1 year. In this, as in the preceding, the vaccination was successful and without any, untoward remit. Both of them were first vaccinations, and in each some places took.

No. 19. Eliza C——, æt. 16 months In this instance the vaccination, first, was not successful, but nothing followed it.

No. 20. Rose Jane B——, æt. 3 months. I did not succeed in obtaining any information about the child, and the same remark applies to the three following cases.

No. 21. Rosina T——.

No. 22. Daniel C——.

No. 23. John C——.

No 24. Caroline W—, æt. 13 years; a revaccination; three places took. The sores never quite healed. About the fifth week they inflamed considerably. An abundant eruption appeared in the eighth week, and at the same time she failed in health, lost her appetite, and had pains in her limbs. When seen in the beginning of the fourteenth week she had a large open sore on her arm, with indurated edges, and prominent florid granulations in the center. This sore was formed by the coalescence of two; a third was healed, but indurated. She had symmetrical excavated ulcers in the tonsils, and enlarged glands in the axilla and back of the neck. She had a copious eruption of dusky flat-topped papules, occurring on almost all parts, excepting the face, and there was also a single, round, condylomatous patch on her tongue. A sketch of her arm was taken on May 19, and on the same date she was seen by many surgeons. Mercurial treatment was commenced on May 17. On May 31, she was rapidly getting well, the rash having almost disappeared and the sore being nearly healed. On June 21, the sore on the arm was healed, but its scar was dusky and covered with scales; the only constitutional symptoms which remained were a few spots on the neck and the condyloma on the tongue. Subsequently this child got quite well, but she had to take mercury for more than two months. Towards the end of July she was again under care for a small condyloma at the anus, but it soon disappeared under treatment.

No. 25. Harriet W—, æt, 15 years; revaccination; successful; no ill consequences.

No. 29. John R—, æt, 8 years. A successful first vaccination. No ill consequences.

REPORT OF A SUB-COMMITTEE OF THE ROYAL MEDICAL AND CHIRURGICAL SOCIETY ON SOME OF THE CASES RELATED BY MR. HUTCHINSON IN THE PAPERS READ AT THE MEETINGS OF THE SOCIETY ON APRIL 25 AND MAY 9, 1871.

On May 16, 1871, we saw, in company with Mr. Hutchinson, the following cases:

The vaccinifer of the first series of cases reported on April 25, and three persons (Cases 1, 2 and 3) who were vaccinated from this child.

Vaccinifer (No. 1), female, æt. 7 months. Had been used on February 7 for vaccinating the series of cases reported by Mr. Hutchinson on April 25.

This child is hydrocephalic; its head is much elongated and widened posteriorly; the fontanelle is somewhat more open than usual. It is pallid, but not unhealthy looking. There are five marks on the left arm from vaccination, which are quite healed. No eruption can be seen anywhere; the anus and genitals are quite clear, but the mother states that there were sores on the latter after vaccination. The glands in both groins are large, and can be very distinctly felt.

The *mother* is rather pale, but looks healthy, and declares she has always been so. This is her first child.

The following persons were vaccinated from the preceding case on February 7, and presented on May 16 the following features:

Case 1.—Female, æt. 17, No. 6 in Mr. Hutchinson's first series; a hearty, robust, plump girl, with bright color. Has, in a horizontal line, three vaccination marks on the left arm, the outer of which is not yet healed: the base of this sore is very slightly thickened. Mr. Hutchinson states that this girl has been living at home with her friends, and taking her medicine very irregularly.

Case 2.—Male, æt. 18, No. 10 in Mr. Hutchinson's first series. A dark-complexioned, strumous-looking lad. Has three cicatrices on his left arm, which present nothing different from recent vaccination marks. There are a few scattered spots of acne on the shoulders and upper part of chest.

Case 3.—Male, æt. 19. A healthy-looking lad. Has an unhealed ulcer, larger than a shilling piece, on the right arm, resulting from vaccination. The sore is covered by a crust, which is disposed to scale slightly, and its base is leathery. Nothing else can be detected.

Mr. Hutchinson states that this is the last case of the series which had been traced, and therefore treatment was commenced later than in the others. He also informs us that in the above three cases the vaccination sores all healed, and subsequently ulceration set in at some of them, which continued to spread slowly until mercury was given, when in about ten days they commenced to heal. Black-wash was applied locally. The same sequence of events had occurred in all the other cases of this group that we had seen.

From the foregoing account, it will be seen that neither the vaccinifer, nor any of the three cases vaccinated from it, presented any symptoms of constitutional syphilis at the time of our examination. But, whilst in Case 2 the vaccination sores were healed, leaving nothing but the ordinary scars, in Cases 1 and 3 there were still open ulcers at the site of the vaccination fourteen weeks after its performance. These ulcers were of a suspicious but not of a conclusive character.

Of the second series of cases reported by Mr. Hutchinson we have seen the vaccinifer (No. 2), and three children (cases 4, 5, 6), who were vaccinated from it.

Vaccinifer (No. 2), male, æt. 7 months. Had been used on February 13 for vaccinating the series of cases reported by Mr. Hutchinson on May 9, and brought under his observation by Mr. Warren Tay.

This child is hydrocephalic; its head is universally enlarged; the fontanelles are perhaps more open than usual. It is a pallid delicate-looking child, and has a slight herpetic eruption on the forehead, but is very lively. It breathes hard through the nose; the mother says it has a cold and is teething. There is a small white scar at the anus, as if from an ulceration. The glands in both groins are large and separate. On the right are five vaccination marks, which are healed.

The *mother* is a bright-complexioned, healthy-looking woman and has never suffered from illness. This is her first child. She has never had a miscarriage, or discharge, or sore nipples. She says the child has been occasionally nursed by the landlady and her children. She knows that one of these was ill, and was sent into the country for its health, and the mother had attended a hospital, but she never heard what was the matter with either of them.

The *father*, æt. 36, cabinet-maker, is a spare pale man, but apparently in health; he has worked thirteen years in the same situation. He denies having had venereal disease of any kind, and readily submitted to examination without previous preparation; nothing could be found except some enlarged separate glands in the left groin, and a slight white scar on the inside of the cheek, opposite the left molar tooth. The only illnesses he has ever had are measles and whooping-cough.

The following cases, which had been vaccinated from this vaccinifer on February 13, presented the appearances detailed below on May 16, thirteen weeks afterwards:

Case 4.—E. T.——, a girl, æt. 4½, No. 2 in Mr. Hutchinson's second series of cases, a pallid, thin, strumous-looking child. On the right arm are two sores covered by crusts; the larger of these has a circumscribed thickened base, which is superficial, and has a leathery feel when compressed; the surface of

this is disposed to scale. The glands in the corresponding axilla are enlarged. There is a scaly eruption consisting of small, circumscribed, for the most part circular, spots of a coffee-color at the back of the neck, the lower part of the abdomen, and the upper and outer part of the thighs, with a general scattered mottling of the trunk, on its anterior surface especially. The inguinal and post-cervical glands are large and indistinct. Both the tonsils are excavated, but not now ulcerated.

Case 5.—A. E. T——, a boy, æt. 18 months, male, No. 1 in Mr. Hutchinson's series, a fat, well-grown, hearty-looking child. On the left arm are two dusky-colored marks of vaccination, which are scaling on the surface, but not ulcerated; these have a thickened base, precisely similar to the preceding case. There is a general mottling of the trunk, which is fading, and a few small scaly spots, resembling those in the foregoing patient, scattered over the abdomen. The glands in each groin are very distinct. There is well-marked ulceration of both tonsils.

The *mother* of these children is a healthy-looking woman; she has never suffered from illness; a rigid cross-examination failed to elicit any history of previous syphilis in herself or either of her children.

Case 6.—W. C——, æt 10, a boy, No. 3 in Mr. Hutchinson's second series. This case was not reported at the Medical and Chirurgical Society. A spare lad, but not unhealthy in appearance; his mother says be has lost much flesh lately. On the left arm the cicatrices of vaccination in infancy show plainly, and below these are two large sores covered with crusts with well-defined, thickened, circumscribed bases, surrounded by a dusky areola. The glands in the corresponding axilla are enlarged. The inguinal and post-cervical glands are very perceptible to touch. There is a scaly eruption, for the most part in small annular patches, over the trunk and limbs, which is fading. On each tonsil is a deep, vertical ulcer, with a gray, unhealthy surface.

The *mother* is a tall, healthy-looking woman; she has never had any serious illness, and no history of previous syphilis in herself or her boy can be obtained. These three cases were vaccinated on the same day, and the ulcers resulting have never healed, but have slowly increased in size. There has been no treatment in any of them.

In our opinion, these three cases present unequivocal evidence of constitutional syphilis, and we see no reason to doubt, from the appearances presented by the arms and from the history of the cases, that the disease had been conveyed by vaccination.

As to the method in which vaccination was performed in these cases, and the character of the fluid inoculated, whether lymph, blood, or both, we could obtain no satisfactory evidence; and with regard to this question, we may refer to the remarks made by Mr. Hutchinson in his paper, where such facts as could be elicited are recorded. [Signed] SAMUEL WILKS,
WM. S. SAVORY,
GEO. G. GASCOYEN,
THOMAS SMITH.

The following case was shown to Dr. Wilks by Mr. Hutchinson, on May 19, being one of the same series

Case 4.—Female, æt. 14. No. 4 in Mr. Hutchinson's second series. There was a round red sore on the arm, raised and granulating. Over the body and arms was a well-marked eruption of bronze-colored, scaly, raised, spots. The tonsils were swollen and slightly ulcerated.

[Signed] SAMUEL WILKS.

SECOND REPORT ON CASES OF VACCINO-SYPHILIS.

The following cases—belonging to the first series reported by Mr. Hutchinson on April 25—were seen by us on August 1, 1871, with Mr. Hutchinson and the medical attendant. They were vaccinated February 7 from vaccinifer No. 1; all have been, and still are, taking mercury; in one or two of them the gums are slightly reddened. They belong to the group first described in the previous report, so that eight of that series have been seen by the committee.

Case 1.—C. R——, female, æt. 26, No. 5 in Mr. Hutchinson's first series. A plump, robust woman, with fresh color, is apparently in perfect health. On the left arm are the cicatrices of three vaccination marks, which are quite healed; they are of a dusky brown color, but opinions differ as to whether they are darker than usual. There are three or four scattered spots of acne on the chest and back. The throat is sound. Mr. Hutchinson states that this patient has never had a characteristic rash.

Case 2.—M. J. L——, female, æt. 18, No. 4 in Mr. Hutchinson's first series. A pale, delicate-looking girl, but does not appear to be out of health. There are three cicatrices from vaccination in a horizontal line on the right arm, which are quite healed and somewhat dusky in color. The glands beneath and behind the angle of the left lower jaw are enlarged, forming a mass which extends over the parotid region and downward into the neck. There is one enlarged gland at the back of the neck on the right side. In each tonsil is a vertical, excavated, unhealthy-looking ulcer. At the bend of the right elbow is one red spot which is scaling, and another less distinct on the left arm at the same situation.

Case 3.—C. T——, male æt. 20, No. 8 in Mr. Hutchinson's first series. A short but rather thick-set man of fair complexion; looks, and says he is, quite well. On the left arm is one dusky-colored cicatrix of vaccination, quite healed. A few small spots of acne are scattered over the upper part of the chest. The fauces are slightly congested, but there is no ulceration.

Case 4.—H. H——, male, æt. 22.—No. 9 in Mr. Hutchinson's first series. A very fair man, with a particularly clear, white skin and bright color, appears to be in perfect health. On the left arm is one dark-colored cicatrix from vaccination quite healed. The tonsils are large and red, but not ulcerated. In the centre of the back, below the scapulæ, is a superficial patch somewhat coppery in color, desquamating slightly and fading off.

Case 5.—W. W——, male, æt. 18, No. 10 in Mr. Hutchinson's first series. A dark-complexioned man, spare and short; looks to be in general health. On the left arm is a deep-colored vaccination scar, not raised and quite healed. A few spots of acne are scattered over the shoulders. The fauces are a little congested, but not ulcerated.

WM. S. SAVORY,
GEORGE G GASCOYEN.

On July 25, 1871, in company with Mr. Hutchinson and the gentleman who vaccinated the cases reported in the first series, I visited a large business establishment in order to examine several of the persons who had been vaccinated from vacciniter No. 1, already reported on.

No. 1.—J. L——, a girl, æt. 18, No. 4 in Mr. Hutchinson's first series. She showed three vaccine marks on one arm of a brownish color. On her body and arms there were a few, small, copper-colored, scaly blotches. I counted about a dozen in all. Her throat showed a deep excavated ulcer on the right tonsil, and

on the left two or three smaller and more superficial ulcers. The posterior cervical glands were enlarged, and on the left side under the jaw there was a circumscribed lymphatic gland much enlarged.

No. 2.—C. R——, a cook, æt. 24, No. 5 in Mr. Hutchinson's first series. On her arm there were two vaccination marks; these presented no remarkable appearance. On examining the neck and body there were seen a few very faint blotches. These would have been scarcely observed had they not been pointed out as the traces of what was said to have been a very evident eruption a few days before. There was nothing worthy of notice in this case.

No. 3.—C T——, a young man, æt. 20, No. 8 in Mr. Hutchinson's first series. On one arm was the cicatrix of the vaccination, only one place having taken. This was of a red color, not very dark, and felt hard when pinched from side to side. On the body and arms, and more especially on the abdomen, there was seen a general mottling or staining of the skin. The rash was slightly darker than the surrounding healthy surface, but was not raised. This was said to be the remains of a rash which was well marked a few days previously. No other symptoms.

No. 4.—W. W——, a young man, æt. 18, No. 10 in Mr. Hutchinson's first series. He had a rash similar to that seen in the preceding case, but more defined. All over the body and shoulders there were distinctly defined blotches of a brownish color. These were evidently the remains of a fading rash, which was said to have been very distinct. The remains of a nearly healed ulcer in the throat were to be seen.

No. 5.—H. H——, a young man, æt. 22, No. 9 in Mr. Hutchinson's first series. Covered with a rash resembling that seen in the preceding case, but still more marked. On passing the hand over the surface it felt somewhat raised as if disposed to be lichenous. The tonsils were much enlarged, red, and injected. This enlargement is probably of old standing.

In the last three cases the eruption might be styled erythematous, while in this case it was disposed to be also papular.

SAMUEL WILKS.

These cases were seen by members of the committee on three separate occasions, which accounts for the differences in the several reports.

When, however, the history of the patients is taken into consideration, and the symptoms presented by them at different periods of time, we can entertain but little doubt that they have been the subjects of constitutional syphilis.

SAMUEL WILKS,
WM. S. SAVORY,
GEO. G. GASCOYEN.

On September 4, 1871, I saw a female, æt. 18, No. 4 of Mr. Hutchinson's first series. She had a large and tender swelling on the left side of the neck, beneath the angle of the jaw. There was a large excavated ulcer on the right tonsil; there were a few faintly marked scaly copper-colored spots about the bend of the elbow. On the right arm were three marks of vaccination of a light copper color. The patient complained of pains in her forehead. She seemed to be in good general health.

THOMAS SMITH.

I entirely agree with the above report, so far as it applies to this case, which was the only one of this group that I had an opportunity of examining.

THOMAS SMITH.

It will be observed that in the series of vaccinations reported by Mr. Hutchinson, not all those vaccination from the same children contracted syphilis. Mr. Hutchinson asks whether the practice followed by some vaccinators of allowing the vesicle to drain after its first contents have been exhausted, and using the weepings, necessarily mixed with the constituents of the blood, for vaccination, may not account for the fact that those first vaccinated in the series escapad the contagion of syphilis.

Evidence has been recorded to show that direct inoculation of blood from a syphilitic patient, may propagate primary syphilis.

In order to avoid the catastrophe of communicating syphilis by vaccination the following precautions have been recommended:

1. A clean lancet should be used.
2. In selecting lymph avoid first children, and those where family history is not well known to the physician.
3. Exercise the most scrupulous care in the performance of vaccination
4. The lymph should be taken from the vesicle not later than the eighth day.
5. The lymph only should be taken, and it should be free from the admixture of blood or other secretions.
6. The lymph should be always taken from a healthy subject.
7. Whenever the surgeon is not fully and thoroughly satisfied of the humanized virus at his command, he should use virus derived directly from the cow.

A graver question is involved than even the possibility of syphilitic infection, and one which threatens the safety of the entire community, namely the avoidance and even forcible resistance of all vaccination and the defeat of all laws devised to protect the people from the ravages of small-pox, on account of the occurrence of such isolated cases, as those of the outbreak at Rivalta, and those reported by Mr. Hutchinson.

The object of vaccination is to produce a real and absolute disease; and no precaution should be regarded as too minute and trifling which is calculated to insure the perfect attainment of this end; the vaccine disease is not natural to man, it is planted on a soil foreign to its existence; and therefore it requires constant watchfulness and judicious cultivation to restrain all conditions or tendencies to deterioration.

If under the best possible selection, and with the utmost care in cultivation, the vaccine virus loses energy as its human transmissions become more and more numerous, it follows logically that, from time to time, new sources of primary supply should be sought for and opened.

We have recorded the essential facts in the history of the cow-pox in various countries, and the medical profession should be always on the alert to discover spontaneous cow-pox, and should ever be ready to introduce new supplies of cow-pox matter.

MODIFIED, OR LACTO-VARIOLOUS INOCULATION.

Docter Basil Thiele, conceived the idea of mixing the virus of small-pox with milk; and in 1839 thus described this process.

Small-pox matter was preserved for ten days between glasses, closed with wax; then after having diluted the matter with warm cow's milk, inoculation was practiced as with ordinary vaccine.

Dr. Thiele stated that the pustules obtained by means of this mixture are much better marked than in ordinary cases, but after about ten transmissions, they end by presenting the characteristics of true vaccine when, however, care has been taken at each transmission to mix the virus of variola with a small quantity of milk taken directly from the cow.

M. Bracuet, at Lyons, and Robert, at Marseilles, claimed to have performed similar experiments about the same time.

The theory which underlies this practice appears to be, that variola has passed from man to the cow, and that during this passage it has undergone that modification which makes of it vaccine; the changes which takes place in the virus of variola can also be produced by a drop of milk in the open air.

Dr. Descieux of Monfort l'Amaury, was attending a woman attacked with variola; three of her children were around her; two had not been vaccinated; having at the time no vaccine matter, he made a mixture of milk and variolous matter, with which he inoculated the children making four incisions in each arm. The sores at the points of insertion occurred as usual and followed the course customarily observed; but on the eighth day one of these children was taken with fever, and three days later from twenty-five to thirty elevations appeared over its body. The other child showed only the sores of insertion, besides which on the eleventh day, five or six supernumary points not far removed from the spots where the virus had been inserted made their appearance.

Notwithstanding this second eruption, M. Descieux still remained undecided; on the eighth day he again took virus from the last child and transmitted it to three others. This inoculation cleared up all his doubts; the newly inoculated being all three seized with well defined although mild attacks of variola. In one, the general eruption made its appearance on the seventh day, and in the two others on the eleventh.

A midwife inoculated five infants with lacto-variolous matter; one of those three had a complete, though rather mild attack of variola, and the two others who were barely two months old, had confluent small-pox, and their lives were in danger.

A final proof of the small efficacy which milk has in modifying variola, was afforded by the fact that these experiments gave rise to an epidemic of small-pox, which affected six vaccinated persons.

The epidemic was not at an end, at the time when M. Descieux, wrote the preceding interesting details.

M. Lanfranchi, sanitary officer at Guitera (Canton of Licaro District of Ajaccio), and physician to the Canton, had to contend, in 1854, with an epidemic of confluent variola, and conceived the idea of testing on his son a mixture of variolous matter and cream from cow's milk. The inoculation of this variolous matter and cream, resulted in the formation of a small scab which fell off or became indolent on the third or fourth day; when on the sixteenth or seventeenth day a well pronounced inflammation manifested itself at the incision; fever was kindled, and *variolous pimples* exhibited themselves in divers places on the body, to the number of seven or eight. The fever was mild in character and the child recovered, six other children of the parish in which the fatal form of confluent variola was prevailing, were subjected to the same mode of inoculation, and like the son of M. Lanfranchi* had a *benign type of varioloid.*

If the disease produced was varioloid, it was of course contagious, and no special advance was made on the old method of *inoculation*, which we have shown, was a comparative mild and harmless operation, often attended with but slight fever and few pustules, and causing death when properly treated in a proportion of not more than one in 600 cases.†

Dr. C. H. Tebault, practiced "Modified Inoculation," or the engrafting of "equal parts of cow's milk and variolous matter taken from the pock in the vesicular stage," in October, 1864, upon some thirty Confederate soldiers in the Ocmulge Hospital, at Macon, Georgia.

Dr. Tebault states that he "engrafted one soldier after another with the modified lymph, until thirty-odd had swelled the list of my experiments. Of thirty-five persons thus successfully inoculated, there only exhibited a few additional pocks, in no case more than six in addition to the seat of puncture."

"*Additional pocks*" are not characteristic of the vaccine disease; but they are characteristic of inoculated small-pox.

By the stringent orders of Surgeon General S. P. Moore, universal vaccination had been and was practiced by the medical officers of the Confederate Army; and a military hospital subject to this rigid rule was not the most favorable position to test the contagious or non-contagious character of the disease induced by "modified inoculation."

The question was rendered still more complicated by the prevalence of small-pox in Macon, and the transferring of small-pox cases occurring amongst the Confererate troops to the small-pox encampment or *tent hospital* three miles from Vineville, under the direction of Assistant Surgeon L. Carter (at that time in the service of the Confederacy).

Dr. Tebault states that "at the encampment above mentioned, this modified inoculation was in general use, vaccination being entirely ignored. It was practiced, I believe, previous to the date of my own experiments, though unknown to me at the time. To this station all casee of variola or varioloid occurring at any of the post hospitals, were immediately sent for treatment."

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*Revue Medico-Chirurgicale, No, 13, p. 543.

†Modified Inoculation by C. H. Tebault M. D. New Orleans Medical and Surgical Journal, July, 1866

Dr. Tebault, writing in 1866, expressed the hope that "Dr. Carter will find an early occasion to make known his very extended experience in the premises."

During my investigations upon hospital gangrene in the Confederate Army at the Empire Hospital, in 1864, I frequently visited the small-pox tent hospital on the outskirts of Vineville, and witnessed the devotion of Dr. Carter to the small-pox patients. I also conducted investigations upon the changes of the urine in variola and varioloid, and performed post mortem examinations.

I also corresponded with Dr. Carter on the subject of inoculation, after the war, and his testimony was to the effect, that he did not mix milk with the variolous matter, but employed the *clear lymph from the pocks before the formation of pus.*

He appeared to attribute the mildness of the resulting variola to the employment of the variolous lymph before the formation of pus.

As therefore there are facts to show that the disease excited by inoculating the mixture of milk and variolous matter is essentially varioloid and capable of producing small-pox in the unprotected, we must therefore discard *lacto-variolous*, (modified) inoculation, for the same reasons that the profession has abandoned SMALL-POX INOCULATION.

Inoculation whether performed with pure small-pox matter, or with a mixture of variolous matter with cream or milk, induces a comparatively mild, and harmless disease to the individual; but it keeps alive the contagium of small-pox, and involves the health and lives of all unprotected persons in contact.

RETRO-VACCINATION.

Retro-vaccination, or the inoculation of cows with vaccine lymph that has been passed through the human body has been performed inumerable times by various observers, with very variable success.

Ceely made various discriminative experiments, and found that whatever the source of the lymph, and whatever its age, if it were only good lymph, it succeeded equally often, and excited equally perfect and productive vesicles.

The most conflicting statements, however, have been made, as to the facility with which cows may be infected with humanized lymph. According to Heim, Hering and Hausmann, the experiment is only rarely successful, perhaps once out of ten or a dozen trials; Fiard met with but six or seven very doubtful successes in seventy experiments; Viborg and Retta were unable to succeed; on the other hand, Caqué, at Rheims, Husson and Tenier, at Paris and Versailles, Sacco, at Milan, and Hillwag, at Eutin, in the early days of vaccination, and more lately, Neumann, at Utrecht, Billing, at Stockholm (in 1832), Lentin, in Weimare in 1835), Prinz, at Dresden (in 1838), Messrs. Ceely, Chauveau and others have succeeded.

Dr. Edward C. Seaton in his valuable hand-book of *vaccination* (p. 96) states that "when active lymph, such as passes from arm to arm with the greatest facility, is passed through the cow, and at once vaccinated back, it yet retains so much of its humanization that it is not able to fail like primary cow-lymph, but will be found also to have *lost* so much of its humanization that on its return to the human subject, it takes effect less kindly; papulation is usually retarded, and though the vaccination may obtain maturity at the ordinary average period, the completion of the maturation is often postponed. The vesicles are often smaller and the disease not really so well developed as the stock from which the lymph *was derived.* Two, three, four, or several removes are necessary to give it *the same activity* as it had before it was transferred.

VARIOLATION OF THE COW; OR PRODUCTION OF VACCINE BY INOCULATION WITH THE LYMPH OF HUMAN VARIOLA.

The records of medicine establish beyond the shadow of a doubt that it is possible to produce vaccine in the cow by small-pox inoculation; but the operation is one of very considerable difficulty; for one case in which the inoculation succeeds, it will fail in at least a dozen.

The earliest efforts at the inoculation of the cow with small-pox failed; Jenner himself did not perform any inoculations of cattle with the lymph of human variola; but as early as 1801, Gasner, of Gunsbury, by inoculating eleven cows with small-pox matter produced on one of them vesicles from which he was able to inoculate four children; these children developed the ordinary phenomena of vaccination, and, with lymph from them, seventeen other children were similarly infected.

In the same year (1801) Loy demonstrated the production of the vaccine disease in the cow from horse-pox (variolae equinæ)

Dr. McMichael stated to the Royal College of Physicians in 1828, that in Egypt it had been discovered by some medical men that fine, active vaccine virus might be produced by inoculating the cow with small-pox from the human body, and that several children had been vaccinated with complete success with the lymph thus generated. (Report of the Vaccination Section of Prov. Med. and Surg. Assoc., 1839, p. 24.)

Dr. Sunderland, of Barmen, in 1830, infected cows with the contagion of variola, by enveloping them in blankets taken from the bed of a patient who had died of small-pox, and by hanging such blankets around the head of the animal, so that they might breathe the effluvia arising from them.

The result, according to the statement of Dr. Sunderland, was that in a few days the cows manifested the symptoms of cow-pox, and lymph taken from them produced genuine vaccine vesicles in the human subject. (Hufeland's Journal, January, 1831.)

Similar attempts to infect cows directly by the repetition of Sunderland's experiments, as those of Mr. Ceely, (1) in England, Mr. Macpherson, in India, and by Mr. Lamb, (2) at the veterinary school at Alfor, at Berlin, Weimar, Bugen Dresden, Kason, Utretch and Stockholm, were unsuccessful.

In 1836, Dr. Thiele, of Kasan, after similar fruitless attempts to infect the cow by inoculation of the variolous virus, succeeded in producing the genuine vaccine disease. From this Dr. Thiele raised a stock of lymph for human vaccinations, which at the time his account was published, had gone through seventy-five transmissions, and been employed in the vaccination of more than 3000 subjects, many of whom had had their security against small-pox, tested by inoculation, and by the closest exposure to the infection of that disease.

Dr. Thiele on various occasions afterwards succeeded in producing cow-pox in cows by variolous inoculation, and he attributes much of his latter success after so many early failures, to the precaution he takes in selecting the animals and in the mode of conducting the experiments.

Dr. Thiele directs that the cows should be selected from four to six years old, which have recently calved, and if possible which have white or fair teats; they should be kept at a uniform temperature (15° R.); the inoculations should be performed at the base of the udder, out of the way of licking, the udder being first shaven; and the variolous lymph should be in a clear limpid state.

(1.) Trans. Prov. Med. and Surg. Assoc., vol, 8, p. 380.
(2.) Trans. Med. and Phys. Society of Calcutta; vol. 6 and vol. 8.

Mr. Ceely, of Aylesburz, succeeded in February, 1839, in producing vaccine vesicles in two sturks, by inoculation with variolous lymph, and in thus establishing lymph-stocks which passed at once into extensive use, so that, in a few months, more than 2000 children had been vaccinated from them. In many of these subjects the protective value of the variola-vaccine lymph was tested by variolous inoculation by Mr. Ceely himself at various periods after the vaccination; no constitutional affection was produced thereby in any case and the local results resembled in every respect those recorded by Willan as having attended the test inoculations practiced in the early days of vaccinatien. The experiments were made on this occasion on three animals, and succeeded on two; but he states that he had many times failed to variolate the cow at different seasons and under varying circumstances by precisely, or pretty nearly the same modes of operating as were successful in these instances. (Trans. Prov. Med. and Surg. Assoc, vol. 8, pp. 379-402.)

Mr. Ceely draws especial attention to the fact, that the transmission of the disease, thus originated, from the cow to the human subject was a matter of some difficulty. Out of twenty punctures made from his first cow, only six vesicles were obtained, and they appeared tardily; he describes the vaccine as fine and "pearl like." Out of sixteen punctures, again made from his second cow, only seven vesicles were obtained. The areola did not appear until from the tenth to the twelfth day. In this difficulty of transmission Mr. Ceely recognises phenomena similar to those observable in vaccinating from primary or natural cow-pox. Subsequent human generations were effected more readily; but in some instances the difficulties were not completely overcome, even in the second removes. In the subsequent removes a marked experiment was observed in the development of the vesicles, and the active manifestation of the primary and secondary symptoms were not less apparent than in the use of natural lymph under corresponding circumstances.

Mr. Badcock, in Deeember, 1840, "succeded in variolating a cow at Brighton, and deriving thereform a stock of genuine vaccine lymph. (A Detail of Experiments Confirming the Power of Cow-pox, etc).

Mr. Badcock, from 1840 to 1867, has by inoculation of cows with the lymph of human variola raised stocks of vaccine lymph for use on no fewer than thirty-seven separate occasions. Every one of these thirty-seven successful experiments was the result of the direct inoculation of the animal with lymph taken from a human subject affected with variola; that no case is included in which lymph taken from a cow that had been variolated was used to inoculate other cows.

Dr. Edward C. Seaton states that the lymph thus obtained by Mr. Badcock, is now (1868) largely employed; it has been supplied to many hundreds of practitioners, and very many thousands of children have been vaccinated with it.

It is worthy of note, however, as illustrating the difficulty attendant on the production of vaccinia in the cow by variolous inoculation, that these thirty-seven successes represent but seven per cent of the experiments undertaken by Mr. Badcock; to obtain them, he had to perform between five and six hundred variolous inoculations.

There is a large amount of medical testimony to show that the lymph obtained by Mr. Badcock, is equal in activity and protective power to that of the early human generations from natural cow-pox.

In 1852, Mr. Ceely's experiment were repeated in America by Dr. Adams, of Waltham, and Dr. Putnam, of Boston, who were able in consequence to "furnish the city and neighborhood of Boston with the vaccine matter used there since that period."

Dr. Leonhard Voight,* superintendent of vaccination at Hamburg, has recently succeded in inoculating cows with human small-pox matter; his results, however, do not possess the value which attaches to those obtained by Thiel, Ceely and Badcock, inasmuch as he performed vaccination simultanous with the variolous inoculation.

We cannot admit that the experiments at Lyons and those of M. Chauveau, show "that it is a delusion to suppose that the inoculation of cows with variola has ever produced in that animal real cow pox; for in fact it produces in the cow real small-pox and nothing else."

The experiments have been too few to warrant this wide inference; at the same time it may be admitted that the local sores produced by the small-pox matter may have been capable of propagating small-pox when inoculated into the human being.

We cannot admit that the hundreds of practitioners who in England have been using Ceely's and Badcock's lymph, during the past forty-four years have not been vaccinating as they supposed, but actually unconsciously variolating their patients—that they have in fact been making their patients so many foci of variolous infection.

ANIMAL VACCINATION.

By the term "Animal Vaccination" is meant the employment for the vaccination of the human subject of the virus of cow-pox, as propagated upon a succession of calves or heifers, the original virus having been derived from pocks upon the cow spontaneously affected with the natural disease.

The practice of animal vaccination, as now followed in Europe and various parts of America, originated with M. Negri, in Naples, who was the first to propagate natural cow-pox by successive vaccinations upon the heifer.

Shortly after the introduction of vaccination into Italy, Troja, of Naples, conceived the idea of taking the vaccine virus from the vaccinated cow for the purpose of human vaccination, and the practice was preserved by him and his successors during many years for the benefit of the upper classes of society. On the death of Trojá, Galbiati continued it, and, although in 1810 these vaccinations were prescribed, yet, in the same year, several distinguished statesmen availed themselves of this method for their own children.

Galbiati was followed by M. Negri, who has had to bear the brunt of official opposition similar to that offered to his predecessors. It is to M. Negri that the world owes the practice of animal vaccination. Troja and Galbiati had both propagated in the heifers a vaccine disease implanted upon them originally from a human source. In fact, they practiced *retro-vaccination*, the result of which was propagated through a series of animals.

At first, M. Negri followed in their steps, and after a time ceased to propagate the virus thus obtained. During the thirty-four years preceding 1868, that he has presided over the animal vaccination in Naples, he has three times obtained a new supply of virus from cases of natural cow-pox, on each occasion maintaining the supply by an uninterrupted succession of inoculations from animal to animal.

It is said that on two occasions M. Negri availed himself of natural cow-pox matter obtained in Italy, but that on a third occasion, in 1858, in which he renewed his supply, it was derived from London.

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* Vaccine and variola by Dr. Leonhard Voight, superintendent of vaccination at Hamburg. North Carolina Medical Journal, October, 1882 No. 10, p, 383-412.]

So thoroughly have all the prejudices against animal vaccination been cleared away, that M. Negri vaccinated from the heifer in the course of a year from 3,000 to 4,000 persons, a number nearly equal to the annual births that take place at Naples, and for several years past, M. Bima, of the Italian Army, has used the animal vaccine alone for his regimental vaccinations and for the pupils of the military colleges.

In 1864, M. Lanoix, a young French physician, visited Naples in order to study the practice of animal vaccination as pursued there, and on his return brought back with him to Paris a calf, and in concert with M. Chambon, set up a private establishment for the propagation of the virus from calf to calf, and for the supply of animal vaccination in Paris.

In his report on vaccination in France during 1864, M. Depaul, in the name of the Académie de Médecine, gave an account of the observations made in Paris upon this subject, and in February, 1866, the French Government placed the sum of 6,000 francs at the disposal of the Academy for the purpose of experiment in the matter. A commission was appointed, the report of which was drawn up by M. Depaul, the Director of Vaccine. This report was favorable to the practice of animal vaccination. The commission, however, were much divided in opinion, and the Academy did not recommend that the practice should be adopted. At first, the virus used by the commission was that in use by MM. Lanoix and Chambon, and which they had previously obtained from Naples. But, after four transmissions of the virus had been made, a new source of virus from natural cow-pox was discovered at Baugency (Loiret), and then the use of the Neapolitan virus was abandoned, and this new and undoubted cow-pox virus alone employed.

MM. Lanoix and Chambon also adopted the use of this virus to the exclusion of that they had before employed, and having in the autumn of the same year (1866) met with another case of natural small-pox at St. Mandé, near Paris, they introduced this lymph also into their practice of animal vaccination. They saw no advantage in keeping these two lymphs distinct, and the virus they have employed since 1866 to the present time is a mixture of the two natural sources discovered at Baugency and St. Mandé. Whatever the origin of the Neapolitan virus may have been, therefore, there can be no question that the inoculations made by the commission (after the first four) and that still made in Paris by MM. Lanoix and Chambon, were transmissions of the virus of a cow-pox of spontanous origin.

The establishment of these latter gentlemen, situated in the centre of Paris (Rue Marsillen), is a private one. They bear the entire expense of it and make a charge to practitioners and others to whom they supply virus. It is carried on like that of M. Negri, at Naples, as a private speculation.

M. Lanoix, however, has, since the summer of 1865, held an appointment from M. Hassen, the Director de l'Assistance Publique, for the weekly performance of vaccinations in the hospitals of Paris, from the calves which he inoculates week by week, and by far the larger part of the vaccinations and re-vaccinations performed in these establishments is done in this way.

From Paris the practice of animal vaccination has extended in many children.

In February 1865, it was introduced into Brussels, by Dr. Warlomont.

Animal vaccination has been inaugerated in Prussia by M. Prosoroff. The practice was introduced into Berlin, by M. Pissin, in June, 1865, and is still carried on there as a private speculation. It is also practiced in the *same* way in Vienna.

The practice of animal vaccination has been established in most of the capitols of Europe.

Animal vaccination was inaugurated in the United States of America, in September, 1870, by Dr. Henry Austin Martin, M. D., of Boston, Massachusetts. (Boston Medical and Surgical Journal, October, 20, 1870).

Dr. Martin received virus by letter from Professor Depaul, of Paris, and also directly through his agent, who returned from Paris, to Boston, on the twenty-third of September, 1870. The virus brought to America, by Dr. Martin was, from the 258th, 259th, and 260th, animal of Depaul's series, beginning with the heifer at Beaugency. During the Franco-Prussian War and the siege of Paris, animal vaccination ceased. In November, 1873, Professor Depaul assures Dr. H. A. Martin, of Boston, that the virus carried from Paris by his agent in 1870, was the last to have left the city, and that during the siege the "*stock*" was lost. The animal virus employed in Paris, since the Franco-Prussian War, is from other stock discovered since that of Beaugency. (Report on Animal Vaccination by Henry Austin Martin, M. D. Reprint from the Transactions of the Amerioan Medical Association, Boston, 1877, p. 17.)

There are two principal grounds on which the practice of vaccination from the heifer has been advocated.

1. The opinion is widely though not universally held, that the results of vaccination from arm to arm are not such as they used to be during the earlier years of the practice of vaccination; in fact, that by repeated human transmissions the virus has become weakened, and that the pocks produced by the introduction of lymph which has passed through a large number of human beings are not so fine or so perfect as those which result from the use of lymph derived recently from the cow.

2. The opinion that certain human diseases may be propagated together with the vaccine when vaccinations are performed from arm to arm.

Galbiati adduced this belief as his reason for practicing vaccination from the cow; arguing that on vaccinating the cow from the human subject, the vaccine disease alone would be communicated to her, the other morbid germs which might be introduced with it remaining without effect. He considered apparently that in practicing retro-vaccination he as it were filtered human vaccine from all human contamination.

The publication within the last few years of alleged outbreaks of syphilis after and, as is stated, as the result of vaccination from diseased subjects, has greatly assisted to popularize the practice of animal vaccination. They not only made a deep impression upon the public mind, but determined the adoption of the practice by some distinguished physicians.

One of the highest living authorities on vaccination, M. Depaul, in a report to the Acadêmie de Mêdecine, which attracted much attention and gave rise to much angry discussion, expressed his views upon this subject so decidedly that nothing was logically left him but to recommend the entire discontinuance of arm to arm vaccination and the use of animal vaccination as the only safe method of propagating the disease.

Dr. Edward C. Seaton,* in his elaborate report on "so called *animal vaccination, in France, Belgium and Holland*, not only embodies the results of the careful investigation of Dr. Edward Ballard, upon the history and practice of animal vaccination in various parts of Europe, but also presents his own extended and elaborate personal observations upon European animal vaccine establishments.

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* Twelfth Report of the Medical Officer of the Privy Council, London, 1870 p. 171-191.

Dr. Seaton then states his general conclusions.

[illegible]

1. [illegible]

2. [illegible]

[illegible]

The [illegible] of a full protection would be very largely diminished, and the danger to the community of spreading small-pox greatly increased by the number of such unprotected persons thrown upon it. [illegible]

[illegible] small-pox [illegible]

My experience with the so called "bovine matter," used in New Orleans during the past four years, corresponds with the preceding statements of Dr. Seaton.

The vaccine matter in points and quills and crusts furnished by the various vaccine farms of the United States, has not given universal satisfaction with the profession on account of the large number of failures which have attended its use.

These failures appear to have been referable to several causes, amongst which we may mention:

1. The inoculation of too much lymph from each vesicle in the cow. In cases where the effort is made to supply a large demand and secure large pecuniary profits with a limited supply of cow-pox matter.

A careful examination of many of the points, revealed the fact that the "dried lymph" was largely composed of the constituents of the blood—namely colored and colorless blood corpuscles—albumen and fibrin.

This result was in many cases due to the use of the bloody serum flowing from the injured points.

2. Carelessness in the selection of the animals vaccinated, and the failure to reject all imperfect points.

3. Changes in the effective powers of the cow-pox matter, consequent upon time, heat and moisture.

In the emergency of the small-pox of 1882 and 1883 in New Orleans, the sanitary officers of the Board of Health of the State of Louisiana, have not been able to meet the issue by the employment of bovine matter alone.

Out of over 12,000, twelve thousand gratuitous vaccinations performed by the president and sanitary officers of the Board of Health of the State of Louisiana, during the past four years, no case of vaccinal syphilis, or of serious accident has been reported. The vast proportion of these vaccinations were performed with humanized virus; and in all cases care was taken to select the matter from healthy subjects.

GENERAL CONCLUSIONS.

From the vast mass of matter relating to vaccination, including the valuable works of Jenner, Pearson, and Woodville, recorded in the preceding pages, we may draw the following practical conclusions:

1. The practice of vaccination carefully performed in accordance with the rules and regulations laid down by Edward Jenner, is as complete a protection from small-pox at the present time as in the early part of the nineteenth century. Millions of human beings have been preserved from the most loathsome and destructive of modern pestelinces during the past eighty-four years by vaccination.

2. Without vaccination, the application of steam and navigation and land travel would have, during the past fifty years, scattered the seeds of small-pox in every part of the habitable globe.

Fortunately for mankind, the great discovery of Jenner was announced before the application of steam, and the revolution of commercial and military operations.

3. The practice of vaccination has not impaired the strength and vigor of the human race, but on the contrary has added vastly to the sum of human life, happiness and health.

4. Variolous inoculation which preceded vaccination, induced a comparatively mild disease, and served as a protection against subsequent casual contagion; but it multiplied the foci of contagion, kept perpetually alive the contagion of small-pox, and increased the fatal ravages of this disease amongst mankind.

5. As a general rule, vaccination in itself is a harmless operation; and whilst lessening the ravages of small-pox it has not had the effect of promoting the occurrence of other fatal maladies.

6. Whilst the protection afforded by vaccination against small-pox is neither unconstitutional nor unlimited, nevertheless many of the conditions upon which it depends are under the control of mankind For the majority of persons vaccinated in infancy and not unusually exposed to the contagion of variola, vaccination serves as a life-long protection against attacks of this disease. Experience however demonstrates that vaccination in infancy is not an absolute protection to *all* persons, against a future attack of small-pox, and in a few persons, small-pox has happened within a very short period of time after vaccination. Neither is small-pox an absolute protection to all persons against a recurrence of the disease, still the recurrence of small-pox is a much more rare event than small-pox after vaccination. Post-vaccinal small-pox is most commonly met with in epidemic seasons, or under circumstances of unusual or prolonged exposure to contagion.

7. When vaccination fails to impart absolute protection against small-pox contagion, it nevertheless modifies, in the majority of instances, the course of the disease and renders it less fatal. The protection against the contagion of small-pox commences from the time that the areola is formed around the vaccine vesicle.

8. A large number of persons, vaccinated in infancy, reacquire, in the progress of years, the power of developing the virus of small-pox in their systems; the breaking of the protective power of infant vaccination is progressive, and occurs most rapidly during the period of most active bodily growth from infancy to puberty; therefore, revaccination should be performed about the age of fifteen, or at any time when small-pox becomes prevalent.

9. The production of a perfect or imperfect vaccine disease, and the amount of protection imparted in vaccination, depends, to a considerable extent, upon the adoption or neglect of certain precautions, having ref-

erence to the source from which the lymph is derived, to the subject vaccinated, and circumstances and mode in which the operation is performed. The opinion is held by many that the vaccine disease is a less perfect and harmless protection against small-pox when produced by the inoculation of virus which has already undergone a large number of transmissions. Hence, it has been concluded that post-vaccinal small-pox would occur more rarely if lymph directly from the cow, or only a few removes, is employed.

Without doubt, the profession should, at all times, seek to discover cases of cow-pox, and recurrence to the original source of vaccine lymph should be had whenever practicable.

10. It is the duty of municipal, state and general governments to regulate and foster a correct system of vaccination, and to institute and sustain the necessary establishments for the supply to all citizens, regardless of condition or race, supplies of pure vaccine matter, derived from healthy huhuman beings, or from animals suffering with the natural cow-pox, or from a system of inoculation of cow-pox from heifer to heifer, or repeated and continuous successions: such general, municipal and state regulations should embrace the revaccination of all persons at the age of sixteen years, and such persons so vaccinated may be regarded as permanently protected.

11. Vaccination should be performed by experienced physicians, and with every attention and precaution as to the cleanliness of the operator and his instruments, and the freshness and purity of the vaccine matter.

12. The experience of the Confederate medical officers during the recent American civil war, 1861-1865, was most extensive and valuable, and tended to establish the necessity of the greatest care in the selection and mode of propagation of the vaccine disease.

The Confederate struggle of 1861-1865 opened a new field in the history of vaccination, and the experience thus obtained led to greater care in the performance of the operation; but the results of this war in liberating the African slaves of the Southern States, necessarily promoted the spread of small-pox amongst an ignorant and comparatively helpless class suddenly elevated to the rights, responsibilities and license of almost absolute freedom.

When the colored people of the South were under the direction and control of their intelligent white masters, small-pox was almost unknown. It is apparent from the results of the prevalence of small-pox since the war, amongst the colored people, that the municipal police and state, governments should take immediate steps to adopt all the necessary statutes, rules and regulations for the protection of the colored people and all other citizens, who neglect vaccination, from the ravages of small-pox.

13. When properly conducted, vaccination is never the medium of propagating small-pox; nor is there any reason to believe that scrofula or tuberculosis has been transmitted by this process. At the same time virus should not be used from unhealty individuals.

14. In children hereditarily infected with syphilis, vaccination hastens the manifestation of the already *existent*, but latent, constitutional taint; and many cases of so-called post-vaccinal syphilis are traceable to the excitation of the latent disease into such active manifestations as will render the vaccine matter capable of transmitting syphilis.

When vaccination excites symptoms of constitutional syphilis, in one already infected with the poison of this disease, either by inheritance or preceding contagion—there is no chancre formed at the place of the insertion of the vaccine virus. But when syphilis is communicated by the *operation* of vaccination, a chancre forms at the point where the vaccine virus was introduced. This is a consideration of importance in tracing vaccine syphilis to its origin in any given series of cases.

15. The numerous cases recorded demonstrate that constitutional syphilis may be transmitted by contagion, by the abnormal secretions, by the blood and by the vaccine lymph.

The vaccine virus and the syphilitic virus may both be inoculated at the same spot and by the same puncture of the vaccine lancet, and in such instance both viruses may take effect, the vaccine vesicle running naturaly through its several stages, and being succeeded by a chancre on the fall of the crusts.

In the case of a vaccinifer constitutionally infected with syphilis, the danger of imparting syphilis with the vaccine is greatest when some of the blood of the vaccinifer has been accidentally mingled with the lymph obtained in puncturing the vesicle. At the same time in vaccinating, syphilis is not necessarily imparted to the person vaccinated.

16. Whilst the danger of syphilitic inoculation exists, when vaccination is carelessly performed; the practical bearing of this fact, however, has been greatly exaggerated; for in the hands of the most experienced physicians and surgeons in Europe and America, it is a danger practically so insignificant as not to detract materially from the value of arm to arm vaccination as a popuiar practice of general applicability.

It is small-pox and not syphilis which threatens our people with destruction, and which is perpetually knocking at their gates. In the Mississippi Valley especially with its teeming millions of rapidly increasing colored people—the danger from syphilitic inoculation under a properly conducted system of vaccination is almost inappreciable, whilst the danger of small-pox contagion is perpetual.

Good physicians and wise legislators should guard the public welfare from the disastrous and murderous effects of the silly reasoning of illogical detractors, the exaggerated fears of the timid, or the subtle insinuations of selfish quackery.

17. Even if the danger of syphilitic contamination by vaccination was greater than it really is, the adoption of the following precautions on the part of the vaccinator, the inoculation of syphilis in vaccination would be almost an impossible event.

(*a*). Lymph for vaccination should, as a rule, not be taken from an adult person. The chances are greater of meeting with a syphilitic vaccinifer in adults than in children.

As a rule, lymph should not be taken from an infant under three months of age, since, if any syphilitic taint exists, it will, most probably, have declared itself during this period.

(*b*). Before taking lymph, a careful examination should be made of the surface of the body of the vaccinifer, of the mouth, genitals and anus, and every infant should be rejected which is manifestly out of health or presents an eruptive or morbid appearance anywhere.

Inquiry should be made into the health of the parents and nurse and the least suspicion of syphilis in either or in the child itself should lead to the rejection of the vaccinifer.

(*c*.) The hands and person and the lancet of the vaccinator should be scrupulously clean; the lancet should be strictly used for vaccination alone, and should never be employed for opening abscesses or other surgical operations; and the lancet should be cleansed and wiped perfectly clean after each vaccination. The use of an unwiped lancet, with the blood of the vaccinated child or person upon it, is not merely careless and un-cleanly, but if syphilis exists in any one of the vaccinated, it may be transmitted through the blood on the point of the lancet.

(d). In taking lymph, great caution should be observed in opening the vesicle, so as not to draw any blood; should blood be accidently drawn, the vesicle should be abandoned, the lancet cleaned, and a new vesicle opened. It is best to abstain from vaccinating more children from one vesicle than can be conveniently done with the lymph supplied from the first puncture made into the surface. Lymph should not be taken from a vesicle after the areola is established, or from one irritated or damaged. Parents and nurses should be warned against moistening the punctured spots or vesicles, when they arise with saliva, and also against applying old linen to the spots unless previously well washed.

(*e*). No child should be vaccinated whose parents or nurse are known at the time to be the subject of any primary or secondary manifestations of syphilitic disease, unless removed temporarily from the influence of contagion.

The vaccinator should, at all times and under all circumstances, retain a due sense of the responsibility which attaches to the act of vaccination, as well as to all others of a professional character.

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